LIBERTY™

CONTINUOUS-PACK AUTOMATED SIDE LOADER

SERVICE MANUAL

ISSUED MAY 2020

TP1L-SM-0520



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WARNING

IF INCORRECTLY USED, THIS EQUIPMENT CAN CAUSE SEVERE INJURY. THOSE WHO USE AND MAINTAIN THE EQUIPMENT SHOULD BE TRAINED IN ITS PROPER USE, WARNED OF ITS DANGERS, AND SHOULD READ AND FULLY UNDERSTAND THIS ENTIRE MANUAL BEFORE ATTEMPTING TO SET UP, OPERATE, ADJUST OR SERVICE THE EQUIPMENT. KEEP THIS MANUAL FOR FUTURE REFERENCE

IMPORTANT SAFETY NOTICE

Proper service and repair are important to the safe, reliable operation of Heil Co.'s products. Service procedures recommended by Heil are described in this service manual and are effective for performing service operations. Some of these service operations may require the use of tools or blocking devices specially designed for the purpose. Special tools should be used when and as recommended. It is important to note that some warnings against the use of specific methods that can damage the product or render it unsafe are stated in the service manual. It is also important to understand these warnings are not exhaustive. Heil could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each method. Consequently, Heil has not undertaken any such broad evaluations. Accordingly, anyone who uses service procedures or tools which are not recommended by Heil must first satisfy himself thoroughly that neither his safety nor the product safety will be jeopardized by the method he selects.

"Heil Environmental, as manufacturer of the equipment that is covered by this manual, is providing a product to the user who has acknowledged to have superior knowledge of the conditions of the use to which the product will be put. Heil Environmental relies upon the user's superior knowledge in specifying any changes or modifications including, but not limited to, the inclusion or non inclusion of options that are required by the user and the Heil product, and for the particular application of the user relative to the Heil product."

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SECTION 1
GENERAL INFORMATION

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LIBERTY™
General Information

INTRODUCTION

The following sections are a guide for maintenance and service of the Heil unit. The sections cover preventive maintenance, adjustment, and troubleshooting hints. Before performing maintenance, check the work area carefully to find all the hazards present and make sure all necessary safeguards or safety devices are used to protect all persons and equipment involved. In order to diagnose a problem quickly and effectively, a service person must be thoroughly familiar with the machine.

This section explains the system and its major components. Diagrams and schematics of the electrical and hydraulic systems are in the Service Manual Schematics section.

NOTICE

For CNG units, this Service Manual should be used in conjunction with any associated CNG System Manufacturer's Operation and Maintenance Manuals. Always read and understand all associated manuals alongside the Heil Parts and Service Manual and Heil Operation Manual before operating or servicing the unit.



IMPORTANT!

- Before starting any maintenance, study this section of the manual.
- Read all hazard warnings and decals on the unit.
- Clear the area of other persons before performing any maintenance.
- Know and understand safe use of all controls.
- It is your responsibility to understand and follow manufacturer’s instructions on equipment and care.

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SERVICE/PARTS ASSISTANCE

Assistance in troubleshooting repair and service is available by contacting the authorized Heil Dealer in your area. Parts are available at your Heil Dealer or through Heil. Heil personnel are trained to give prompt, professional assistance.

ALWAYS give the unit serial number in all correspondence relating to the equipment.

See the back cover of this manual for Heil contact information.

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RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
BODY AND TAILGATE ASSEMBLIES		
022-3996	SEAL, TUBING, 1-14", TAILGATE	1
019-1095	SPRING, 1" OD X 6"	1
003-4438	SPH BRG-QUAD LUB LOW	1
LOADER AND GRABBER ASSEMBLIES		
062-0805	ASSEMBLY, GRABBER, ROLLER, 4”	1
062-0804	ASSEMBLY, ROLLER, TRI-CUFF	4
062-0712	ROLLER, GRABBER, 4”	2
019-1404	SPRING, GRABBER, HUGGER EXTENSION	1
071-0837	BELT, HUGGER, 30/150 GAL.	3
071-0843	BELT, ARM, 60/90 GAL., 47”	1
093-2784	BEARING, RETAINMENT	4
003-4432	PIVOT BEARING	1
003-5083	BEARING, 2X3	1
003-5084	BEARING, 3X1	2
022-3922	SEAL, BUSHING -2"	2
018-0804	SPRING	1
HYDRAULICS		
001-7003	CYLINDER, PACKER	1
001-6991	CYLINDER, TAILGATE	2
001-7069	CYLINDER, LIFT AND REACH	2
001-6973	CYLINDER, DUMP	1
001-7045	CYLINDER, BODY HOIST	1
031-6194	VALVE, BODY	1
031-6412	VALVE, LOADER	1
031-2616	VALVE, SHUT OFF, SUCTION LINE, 2"	1
060-0417	CAP, FILLER	1
075-0712	FILTER, BREATHER	1
075-0721	FILTER, REGULATOR, W/GAUGE	1
075-0578	FILTER, SUCTION, STRAINER	1
075-0953	FILTER, RETURN LINE	1
067-0630	OIL LEVEL SIGHT/TEMP GAUGE	1
031-6264	N-LINE CHCK VALV, #16 FSAE 5PSI	2
ELECTRICAL		
063-0122	SWITCH, PROXIMITY, NO, SOURCING, 18MM	1

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RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY
063-0123	SWITCH, PROXIMITY, NO, SOURCING, 30MM	1
063-0115	SWITCH, PRESSURE, W/CONNECTOR, PACKARD	1
069-0032	KIT, MICRO RELAY	2
108-5031	WHISKER SWITCH	1
CONTROLS		
031-6254	JOYSTICK, PNEUMATIC, 3 PUSH BUTTONS	1
075-0953-012	SWITCH, ELECTRICAL, FILTER, RETURN LINE	1
108-2280	RUBBER BOOT, 4000	2
108-6422	SWITCH TOGGLE	2

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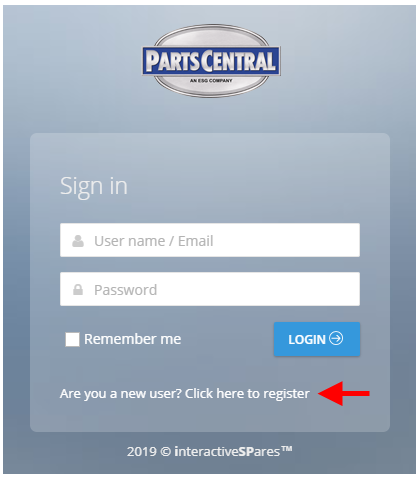
ELECTRONIC PARTS CATALOG (EPC)

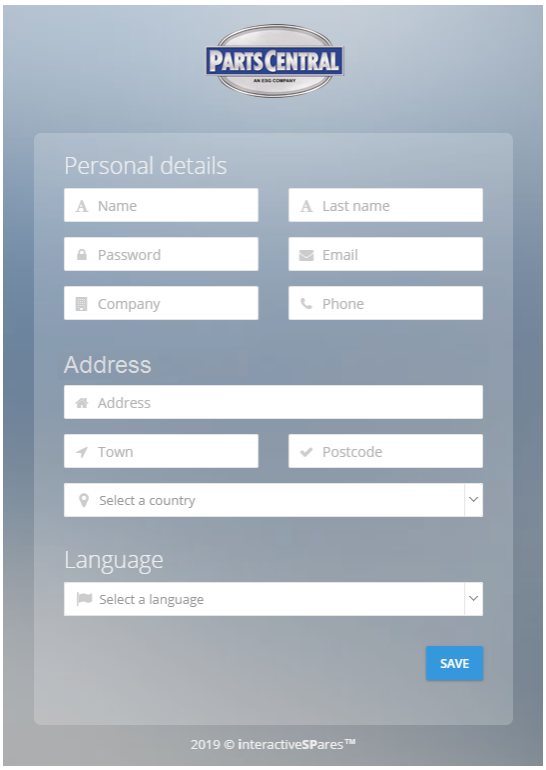
The Parts Central EPC includes electronic versions of the Heil Parts Manuals, specific to a Customer's truck configuration and options. After registering and logging in, the user can search by **Keyword(s) or Part Number** and/or **Heil Body Serial Number** to quickly identify a spare part or browse a custom parts catalog.

Note: This tool is currently for reference use only and the cart functionality is disabled. Please contact your local Heil Dealer for parts quoting and ordering.

Registration and Login

Register online to gain access: **https://epc.partscentral.com**. Upon registration, you will receive an email notification confirming registration. Within 24 hours, your registration will be approved and you can log in using the **login page**.

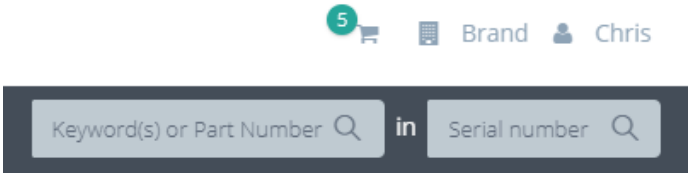




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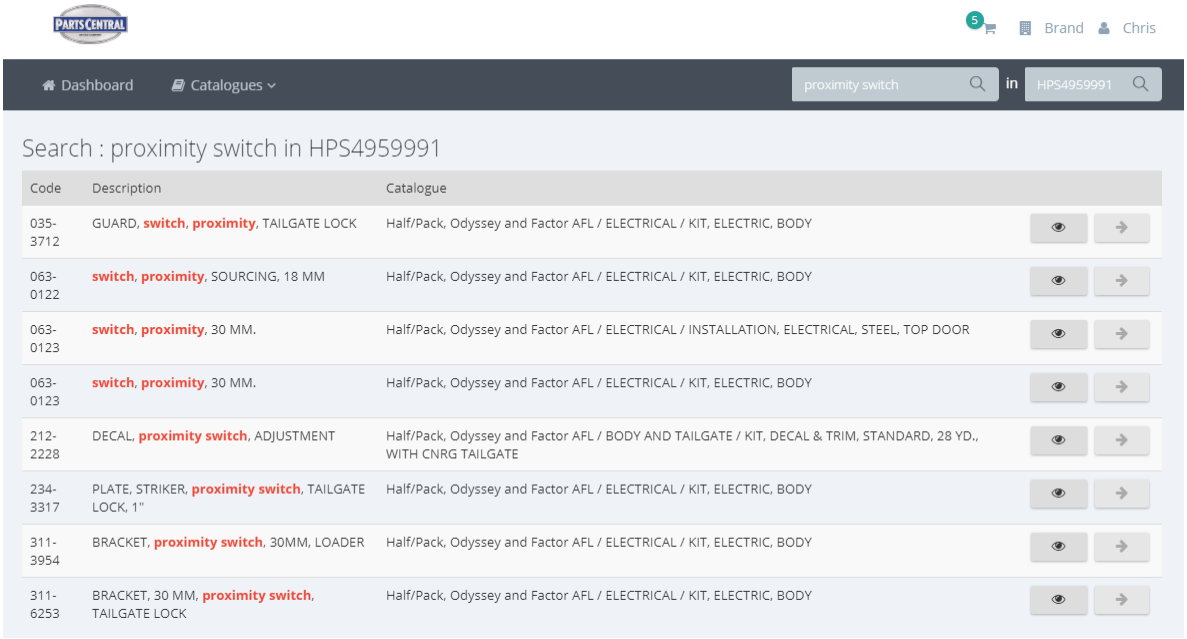
Search by Part Keyword(s) or Part Number in Body Serial Number

After login, you will land on the User Dashboard. At the top right of the Dashboard, there will be two search fields, as shown in the image below.



You can search by **Keyword(s) or Part Number** within a specific Heil Body **Serial Number**. For example, if you are looking for a **proximity switch** for Body Serial Number **HPS4959991**, you can enter this information into these two fields and the search results will include all parts within the **HPS4959991** body that contain the keywords **proximity** and **switch** within their part descriptions. See the image below.

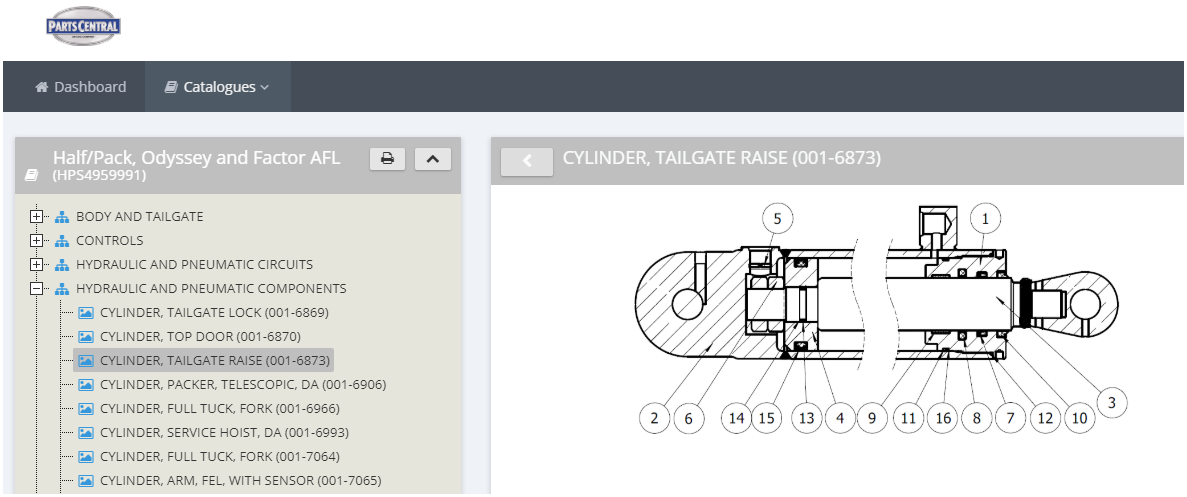
From the search results list, you can select the right arrow icon to view the part within its associated assembly/kit, helping you identify the needed part. Alternatively, you can select the eye icon on the right to see part specifics (including any notes) and quickly add to cart (although this functionality is not yet turned on in the Parts Central EPC).



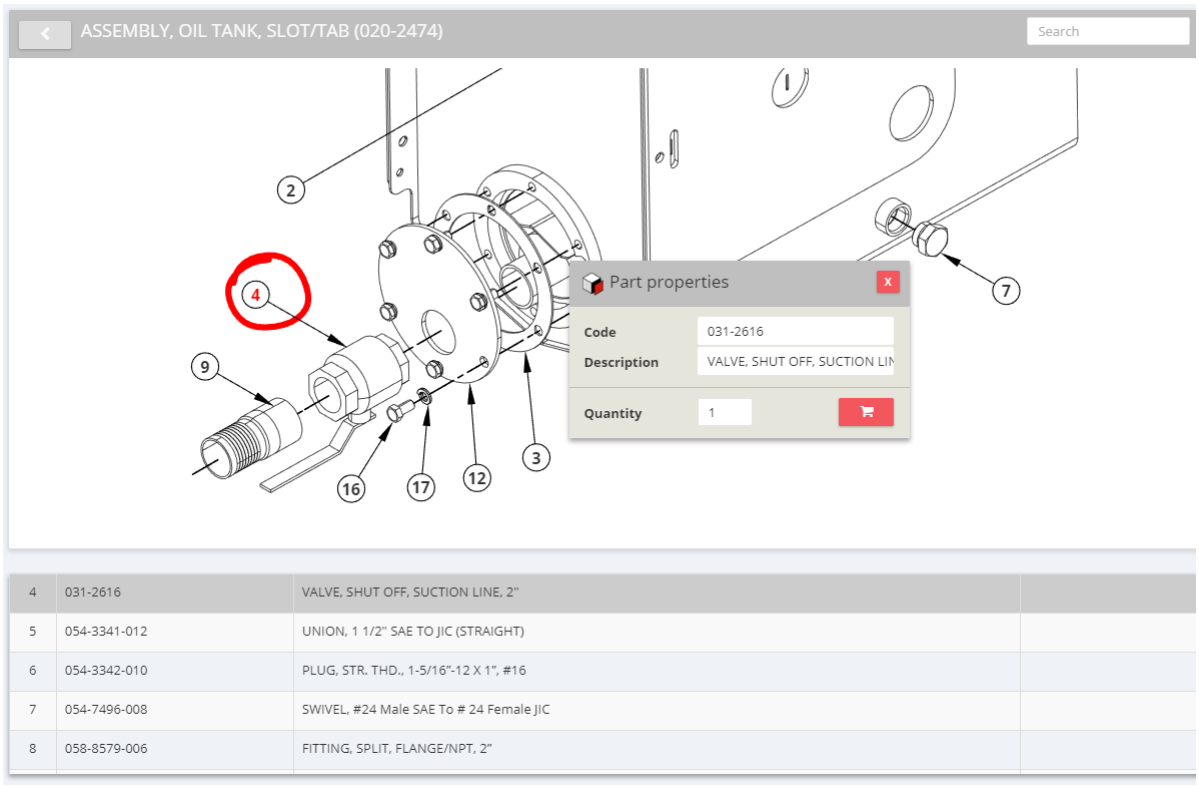
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Search by Body Serial Number

If you want to view an entire parts catalog for a particular Heil unit, you can search by only the Heil Body **Serial Number**, leaving the **Keyword(s) / Part Number** field blank. The search result will then be the Body Serial Number-specific parts catalog with familiar catalog sections that you can browse. You can navigate through the catalog using the section/topic menu in the left panel and then adjust an assembly/kit illustration size in the right panel with the mouse center scroll wheel. Additionally in the right panel, you can drag the image when holding down the left mouse button. See the image below.



For each assembly/kit, you can click on the interactive part callout reference numbers to highlight the corresponding part in the parts list, or you can click on a parts list line item to highlight its position on the illustration. See the image below.



4	031-2616	VALVE, SHUT OFF, SUCTION LINE, 2"	
5	054-3341-012	UNION, 1 1/2" SAE TO JIC (STRAIGHT)	
6	054-3342-010	PLUG, STR. THD., 1-5/16"-12 X 1", #16	
7	054-7496-008	SWIVEL, #24 Male SAE To # 24 Female JIC	
8	058-8579-006	FITTING, SPLIT, FLANGE/NPT, 2"	

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PRECAUTIONARY STATEMENTS

Listed below are the definitions for the various levels of hazards. It is important that the operators of this equipment and people who service units read and understand all warnings as they relate to this equipment operation.

- **DANGER** – indicates a hazardous situation, which if not avoided WILL result in DEATH or SERIOUS INJURY if you do not follow proper instructions.
- **WARNING** – indicates a hazardous situation, which if not avoided COULD result in DEATH OR SERIOUS INJURY if you do not follow proper instructions.
- **CAUTION** – indicates a hazardous situation, which if not avoided COULD result in MINOR to MODERATE INJURY if you do not follow proper instructions.
- **NOTICE** – addresses practices not related to personal injury, such as property damage or damage to the equipment.

The following warnings are generally in the Operator's Manual for each specific unit or are generic safety messages if an Operator's Manual does not have these safety messages. Other safety alert messages may be in other sections of the Parts and Service Manual or in an Operator's Manual. You must read and obey all safety alert messages in any manual produced by Heil to support your unit.

⚠ WARNING

Failure to follow all instructions and safety precautions in this manual, in the Service Manual, in other manufacturer's manuals and on the safety decals attached to the product could result in serious injury or death to operators or bystanders and/or damage to property. Do not operate this vehicle before you read and understand the Operation Manual, the Parts Service Manual for this unit, other applicable manufacturer's manuals and the safety decals on the product. Each operator of this unit must read and understand all directions in this manual before they first operate this vehicle. Keep this manual in the cab for new operators and to remind all operators about safe use.

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas.

⚠ DANGER

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand all of the instructions in this manual. Failure to do so can result in death or serious injury to operators or bystanders.

⚠ DANGER

Make sure the unit is on firm, stable ground before you raise the body and clear the area of all unnecessary people. Do not prop a body unless it is on firm, stable ground. A unit not on firm, stable ground can roll when raising or propping the body. This can cause death or serious injury to you or bystanders.

⚠ DANGER

Always prop the tailgate when you leave it raised for maintenance, service or cleaning procedures. Any part of your body between the unit's body and the tailgate while you prop the tailgate or when the tailgate is propped is dangerous. Death or serious injury can occur if any part of your body is between the tailgate and the body if the tailgate suddenly closes.

⚠ DANGER

A tailgate in motion is dangerous. Serious injury or death can occur if a person is struck by a moving tailgate or becomes trapped between the tailgate and the body. Clear the area near the tailgate of all unnecessary people before you lower the tailgate.

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⚠ DANGER

The packer and crusher panels are dangerous. They can cause death or serious injury if a person is inside the hopper. Make sure no one is inside the hopper before you begin a packer or crusher function. Put the unit in the Lock-Out/Tag-Out mode if it is necessary to enter the hopper area.

⚠ DANGER

Keep all parts of your body out from underneath the unit's body and away from the cylinders when raising or lowering the body. Serious injury or death will occur if the unit's body suddenly lowers and traps a part of your body.

⚠ DANGER

Do not raise a body that has refuse while you do maintenance or service procedures. Refuse in the body can make the unit unstable. Always unload refuse from the body before you raise it for maintenance or service procedures. Always use the body props when you raise the body for maintenance or service procedures.

⚠ DANGER

A full or partially full load of refuse is dangerous while you lower the body with inoperative controls. Refuse in the body can make the unit unstable and cause it to overturn. Serious injury or death can occur if the unit overturns due to instability caused by the loaded refuse. REMOVE the refuse before you block the body.

⚠ DANGER

Lifting equipment that does not have sufficient lifting capability is dangerous. Equipment can fail and cause death or serious injury to the operator or bystanders. Make sure the lifting equipment has sufficient lifting capability and clear ALL persons not involved with the procedure away from the area.

⚠ DANGER

The lifting equipment can fail. Serious injury or death can occur if the lifting equipment breaks and the body falls or the unit rolls over. Do not place your body or limbs between the unit's body and chassis while you remove the body-supporting timbers. Be attentive and prepared to move quickly away from the unit in the event there is an equipment failure.

⚠ DANGER

Contact of the unit with overhead electric lines is dangerous. Death or serious injury can occur. Make sure there is adequate overhead clearance before you raise the container. If the unit does make contact with overhead electric lines do not touch any metal in the cab. Stay in the unit until help arrives..

⚠ WARNING

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out mode, equipment operated while you do maintenance or service procedures, go in the hopper or climb in or on the body or on equipment can cause death or serious injury.

⚠ WARNING

Moving equipment can be dangerous to bystanders. Death or serious injury can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

⚠ WARNING

Raising the body with the tailgate closed can damage the underride bumper. The under ride bumper can hit the ground when the tailgate is not fully raised before you raise the body. Death or serious injury can occur and also cause damage to the unit.

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⚠ WARNING

Clear all people of the area before you lift a refuse container. Make sure the refuse is secure in the refuse container before you lift the container. Loose refuse can fall and cause death or serious injury.

⚠ WARNING

The hydraulic fluid can be under pressure and can spray while you open the connection. Hydraulic fluid can cause damage to your eyes, hands or skin. Wear protective eye glasses, gloves and other clothing as necessary to protect you from the hydraulic fluid.

⚠ WARNING

A unit that needs service or repair can malfunction and create a dangerous condition. A part failure during operation can cause death or serious injury to a person or damage to the unit. Repair or replace any failed or defective part immediately

⚠ WARNING

Improper dumping of the refuse can cause the unit to tip or rollover. Death or serious injury can occur if the unit rolls or tips over. Empty as much refuse as you can with the packer panel before you raise the body.

⚠ WARNING

Do not move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised can make the body unstable and tip or roll the unit over. This can result in death or serious injury to the operator and damage the unit. Use only sufficient movement to loosen the load so that it will leave the body.

⚠ WARNING

Isopropyl alcohol is flammable and is harmful to eyes and skin. Keep isopropyl alcohol away from heat or open sources of ignition. Flush eyes and skin with water for 15 minutes after contact. Seek immediate medical help.

⚠ WARNING

A container that is not locked to the container lift mechanism is dangerous. The container can fall off the container lift mechanism and cause death or serious injury. Make sure you engage and lock the container latch bars before you lift the container.

⚠ WARNING

Grabbing a refuse container with too much pressure can damage the container. Pieces of the container can “fly” off the container and cause moderate or minor injury to a bystander. Use enough pressure with the grabber to raise the container with the lift arm and not damage the container.

NOTICE

Do not move the unit forward or backwards excessively fast (lurch) to dump the refuse load. Excessively fast movements with the body raised puts a very high load on the body raise cylinders and could damage one or both cylinders and make the body unstable unable to lower. Inspect the cylinders after you dump each load and replace if necessary.

NOTICE

Do not operate the unit or perform repair or maintenance procedures on the unit until you read and understand the instructions in this manual. Failure to do so can result in damage to the unit or other property. If you do not understand a procedure or instruction, tell the owner or the designated person immediately. Do not operate the unit if you do not understand all procedures and instructions in this manual. The owner or designated person can contact your Heil dealer or Heil for additional help. See the Operator’s Manual or Service Manual for contact information.

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NOTICE

Grabbing a refuse container with too much pressure can damage the container. The container can become unusable. Use enough pressure with the grabber to raise the container with the lift arm and not damage the container.

NOTICE

Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the procedures that follow. Contact your supervisor or ESG Technical Service if you have any questions about Lock-Out/Tag-Out procedures.

NOTICE

You can order Lock-Out/Tag-Out Tags through your Heil Dealer or through Heil.

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LOCK-OUT/TAG-OUT PROCEDURES

NOTICE

Always use your employer's Lock-Out/Tag-Out procedures. If your employer does not have Lock-Out/Tag-Out procedures, use the procedures that follow. Contact your supervisor or Heil Technical Service if you have any questions about Lock-Out/Tag-Out procedures.

Watch the Service Shack Video online at **www.Heil.com/Heil-Service-Shack** by selecting **Lock-Out/Tag-Out**.

Put the unit in a Lock-Out/Tag-Out mode:

- BEFORE you enter the unit's body
- BEFORE you do maintenance, repair or cleaning procedures on the unit.



Figure 1. Lock-Out/Tag-Out (Do Not Operate) Tag

Follow These Steps:

1. APPLY the brakes. MAKE SURE the brakes do not let the unit move and they work properly.
2. Chock all wheels.
3. SET the tailgate props when you raise the tailgate for service, maintenance or cleaning.
4. SET the body props when you raise the body for service, maintenance or cleaning.
5. When there are in-cab controls, turn the ignition switch to ON then:
   a. Move the switches of the hydraulic controls. This relieves the pressure in the cylinders.
   b. Turn the ignition switch to OFF.
6. When there are no in-cab controls, move the outside control levers to relieve the pressure in the cylinders.
7. Put a LOCK-OUT/TAG-OUT Tag onto the steering wheel.
8. Remove the ignition key from the cab, lock the vehicle, and put the key in a secure location.
9. You can order Lock-Out/Tag-Out Tags (Part Number 212-1586) through your Heil Dealer or through Heil.

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STORING REFUSE IN THE BODY

Heil does not recommend storing refuse in the body overnight. The different types of debris and corrosive elements usually collected can cause severe corrosion inside the body decreasing the life of your body. This corrosion can affect unloading and decrease the structural life of the body. In addition, storing refuse in the body overnight can increase the risk of fire.

MAINTENANCE/LUBRICATION INFORMATION

Before performing maintenance, check the work area carefully to find all the hazards present and make sure all safe guards or safety devices are in place to protect all persons and equipment involved.

WINCH GEAR OIL

When the unit has a winch option, check the level of the winch's gear oil every 40 hours of operation. Fill as needed with AGMA Grade 5 EP (90wt.) for an 8,000 lb. winch and AGMA Grade 7 EP (140 wt.) for a 12,000 lb. winch.

GREASE LUBRICANT RECOMMENDATION

Use a grease gun. Before engaging grease gun, clean the fitting. Always pump enough grease to purge the joint of contaminated grease and wipe off the excess. Lubricate a unit as given on the lubrication decal on the unit and in the **Body Lubrication Guide** 79 paragraph of this section.

Use grade NLG1000 grease or equivalent.

OIL LUBRICANT RECOMMENDATION

Use only non-detergent engine oil to lubricate all moveable mechanical parts not furnished with grease fittings. Apply sufficient oil to give good lubrication, but do not bathe parts in oil. Always wipe off excess oil.

HYDRAULIC OIL SPECIFICATIONS

Hydraulic fluid is one of the most important component in hydraulic system. It transmits power, provides lubrication and cooling function and has following features:

- High viscosity index
- Long service life
- Outstanding cold temperature flow properties
- Fast water separation
- Excellent anti-wear performance
- Long term oxidation stability
- Superior rust and corrosion protection
- Exceptional shear stability / filterability
- Excellent thermal and hydrolytic stability
- Anti-foam characteristics
- High performance of air release characteristics

Current Heil standard hydraulic oil is Shell Tellus S2 VX 32. Please see product TDS and MSDS for more detail information about it. We strongly recommend to use it on Heil products to get best system performance and oil service life.

The following oils can be used on Heil products if Heil standard hydraulic oil (Shell Tellus S2 VX 32) is not available. But system performance and/or oil service life may be compromised.

- Castrol Dual Range HV 32
- Chevron Rando HDZ 32
- Mobil DTE 10 Excel 32

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STANDARD TORQUE DATA FOR NUTS AND BOLTS

The following recommended torque data is for use as a general guideline. Recommended torque, in foot pounds, for all Standard Application nuts and bolts provided in the following table.

NOTICE

Torque specifications on a drawing override torque values in the Standard Torque Data for Nuts and Bolts Table.

- All thread surfaces are clean and lubricated with SAE-30 engine oil. See notice above.
- Joints are rigid, that is no gaskets or compressible materials are used
- When re-using nuts or bolts use minimum torque values

STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE

Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
1/4	STD	20	5	9	8	6	
0.25			8	13	12	8	
		28	5	10	9	7	
			8	15	13	10	
	Lock	20	5				6
			8				8
		28	5				7
			8				10
5/16	STD	18	5	19	17	12	
.3125			8	27	24	17	
		24	5	21	19	14	
			8	29	27	19	
	Lock	18	5				12
			8				17
		24	5				14
			8				19
3/8	STD	16	5	33	30	22	
.375			8	47	42	31	
		24	5	38	34	25	
			8	54	48	35	
	Lock	16	5				22
			8				31

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STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE

Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		24	5				25
			8				35
7/16	STD	14	5	53	48	35	
.4375			8	76	68	49	
		20	5	60	54	39	
			8	84	76	55	
	Lock	14	5				35
			8				49
		20	5				39
			8				55
1/2	STD	13	5	82	73	53	
.500			8	115	104	75	
		20	5	92	83	60	
			8	130	117	84	
	Lock	13	5				53
			8				75
		20	5				60
			8				84
9/16	STD	12	5	118	106	77	
.5625			8	166	150	108	
		18	5	131	118	85	
			8	186	167	121	
	Lock	12	5				77
			8				108
		18	5				85
			8				121
5/8	STD	11	5	162	146	106	
.625			8	230	207	149	
		18	5	184	166	120	
			8	260	234	169	
	Lock	11	5				106
			8				149

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STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE

Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		18	5				120
			8				169
3/4	STD	10	5	288	260	188	
0.750			8	408	367	265	
		16	5	322	290	209	
			8	455	409	295	
	Lock	10	5				188
			8				265
		16	5				209
			8				295
7/8	STD	9	5	465	418	302	
0.8750			8	657	591	427	
		14	5	513	461	333	
			8	724	652	471	
	Lock	9	5				302
			8				427
		14	5				333
			8				471
1	STD	8	5	697	627	453	
1.0000			8	984	886	640	
		14	5	782	704	508	
			8	1105	994	718	
	Lock	8	5				453
			8				640
		14	5				508
			8				718
1-1/8	STD	7	5	869	782	565	
1.1250			8	1395	1256	907	
		12	5	975	877	634	
			8	1564	1408	1017	
	Lock	7	5				565
			8				907

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STANDARD TORQUE DATA FOR NUTS AND BOLTS TABLE

Bolt Size (D)	Nut Type (STD/Lock)	Thread Turns per Inch (p)	Grade	Heil Plain Dry Condition Torque Value (ft-lbs)	Heil Zinc Plated Fastener Torque Value (ft-lbs)	Heil Lubricated Fastener Torque Value (ft-lbs)	Heil Deformed Lock Nut Torque Value (ft-lbs)
		12	5				634
			8				1017
1-1/4	STD	7	5	1227	1104	797	
1.2500			8	1969	1772	1280	
		12	5	1358	1222	883	
			8	2179	1961	1417	
	Lock	7	5				797
			8				1280
		12	5				883
			8				1417
1-3/8	STD	6	5	1608	1447	1045	
1.3750			8	2580	2322	1677	
		12	5	1830	1647	1190	
			8	2938	2644	1909	
	Lock	6	5				1045
			8				1677
		12	5				1190
			8				1909
1-1/2	STD	6	5	2134	1921	1387	
1.5000			8	3425	3083	2226	
		12	5	2401	2161	1561	
			8	3854	3468	2505	
	Lock	6	5				1387
			8				2226
		12	5				1561
			8				2505

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BOLT TYPE IDENTIFICATION CHART

IH Type	S.A.E. Grade	Description	Bolt Head Marking**
1	1 or 2	No radial lines. Low or medium carbon steel not heat treated. NOT USED, replace with same grade bolt.	
5	5	Three radial lines. Quenched and tempered medium carbon steel.	
8	8	Six radial lines. Quenched and tempered special carbon or alloy steel	

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TORQUE FOR HYDRAULIC TUBES AND FITTINGS

FLAT FACE ORFS FITTINGS		
	SET WRENCH TO	
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS
1/4"	21 ft-lbs.	250 in-lbs.
3/8"	33.5 ft-lbs.	400 in-lbs.
1/2"	50 ft-lbs.	600 in-lbs.
5/8"	50 ft-lbs.	600 in-lbs.
3/4"	75 ft-lbs.	900 in-lbs.
1"	105 ft-lbs.	1260 in-lbs.
1-1/4"	130 ft-lbs.	1560 in-lbs.
1-1/2"	178.5 ft-lbs.	2140 in-lbs.

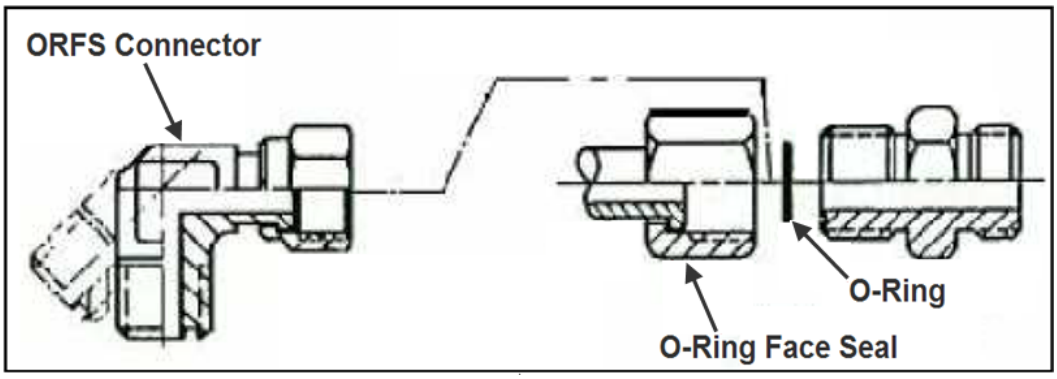


Figure 2. Torque for Hydraulic Tubes and Fittings

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TORQUE FOR HYDRAULIC TUBES AND FITTINGS (CONTINUED)

37 DEGREE FLARE (JIC) FITTINGS		
	SET WRENCH TO	
NOMINAL TUBE OD	TORQUE WRENCH SETTING	ALTERNATE TORQUE UNITS
1/8"	6.5 ft-lbs.	80 in-lbs.
3/16"	9 ft-lbs.	110 in-lbs.
1/4"	12.5 ft-lbs.	150 in-lbs.
5/16"	16.5 ft-lbs.	200 in-lbs.
3/8"	21 ft-lbs.	250 in-lbs.
1/2"	41 ft-lbs.	490 in-lbs.
5/8"	64 ft-lbs.	770 in-lbs.
3/4"	89 ft-lbs.	1070 in-lbs.
7/8"	105 ft-lbs.	1260 in-lbs.
1"	130 ft-lbs.	1560 in-lbs.
1-1/4"	142.5 ft-lbs.	1710 in-lbs.
1-1/2"	178.5 ft-lbs.	2140 in-lbs.
2"	250 ft-lbs.	3000 in-lbs.

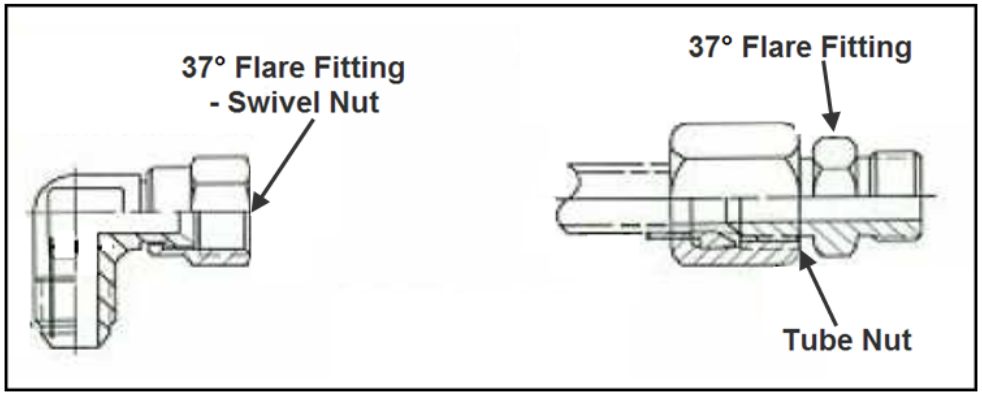


Figure 3. Torque for Hydraulic Tubes and Fittings

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TORQUE FOR HYDRAULIC TUBES AND FITTINGS (CONTINUED)

FROM SAE J2593 TABLE 7		
BOSS (ORB)	**(STEEL) SET WRENCH TO**	
NOMINAL TUBE OD	**TORQUE WRENCH SETTING**	**ALTERNATE TORQUE UNITS**
3/16"	9 ft-lbs.	110 in-lbs.
1/4"	16.5 ft-lbs.	200 in-lbs.
5/16"	21 ft-lbs.	250 in-lbs.
3/8"	29 ft-lbs.	350 in-lbs.
1/2"	64 ft-lbs.	770 in-lbs.
5/8"	89 ft-lbs.	1070 in-lbs.
3/4"	130 ft-lbs.	1560 in-lbs.
7/8"	178.5 ft-lbs.	2140 in-lbs.
1"	224 ft-lbs.	2690 in-lbs.
1-1/4"	250 ft-lbs.	3000 in-lbs.
1-1/2"	300 ft-lbs.	3600 in-lbs.
ALUMINUM SET		
TORQUE WRENCH SETTING	**ALTERNATE TORQUE UNITS**	
6 ft-lbs.	70 in-lbs.	
11 ft-lbs.	130 in-lbs.	
14 ft-lbs.	170 in-lbs.	
21 ft-lbs.	250 in-lbs.	
37.5 ft-lbs.	450 in-lbs.	
54 ft-lbs.	650 in-lbs.	
91.5 ft-lbs.	1100 in-lbs.	
116.5 ft-lbs.	1400 in-lbs.	
146 ft-lbs.	1750 in-lbs.	
154 ft-lbs.	1850 in-lbs.	
200 ft-lbs.	2400 in-lbs.	

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TORQUE FOR HYDRAULIC TUBES AND FITTINGS (CONTINUED)

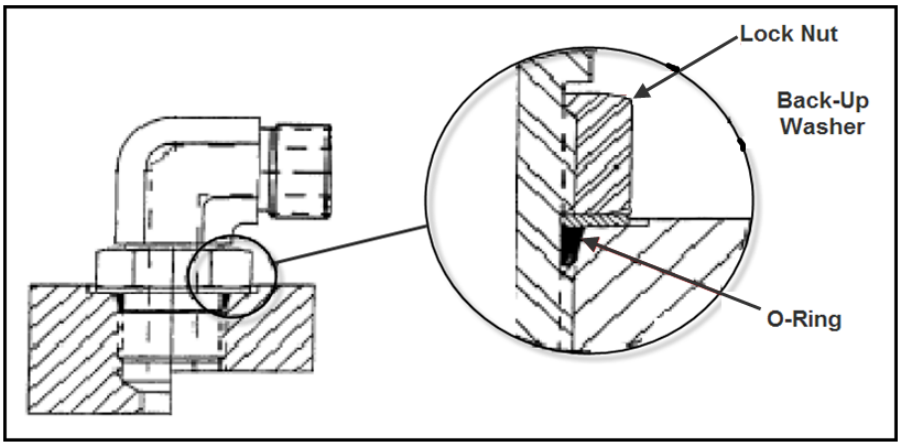


Figure 4. Torque for Hydraulic Tubes and Fittings

SPLIT- FLANGE (HALF CLAMP) CONNECTORS (CODE 61)				
		SET WRENCH TO		
NOMINAL TUBE OD	BOLT SIZE	BOLT TORQUE [FT-LBS]	BOLT TORQUE [IN-LBS]	ALUMINUM FT-LBS [IN-LBS]
1/2"	5/16-18 x 1.25	17 ft-lbs.	200 in-lbs.	12 [130]
3/4"	3/8-16 x 1.25	25 ft-lbs.	300 in-lbs.	17 [200]
1"	3/8-16 x 1.25	32 ft-lbs.	380 in-lbs.	21 [250]
1-1/4"	7/16-14 x 1.50	41 ft-lbs.	490 in-lbs.	27 [320]
1-1/2"	1/2-13 x 1.50	53 ft-lbs.	640 in-lbs.	35 [420]
2"	1/2-13 x 1.50	61 ft-lbs.	730 in-lbs.	40 [480]
2-1/2"	1/2-13 x 1.75	86 ft-lbs.	1030 in-lbs.	56 [670]
3"	5/8-11 x 1.75	144 ft-lbs.	1730 in-lbs.	94 [1130]
3-1/2"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.	82 [980]
4"	5/8-11 x 2.00	125 ft-lbs.	1500 in-lbs.	82 [980]
5"	5/8-11 x 2.25	125 ft-lbs.	1500 in-lbs.	82 [980]

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TORQUE FOR HYDRAULIC TUBES AND FITTINGS (CONTINUED)

SPLIT- FLANGE (HALF CLAMP) CONNECTORS (CODE 62)				
		SET WRENCH TO		
NOMINAL TUBE OD	BOLT SIZE	BOLT TORQUE [FT-LBS]	BOLT TORQUE [IN-LBS]	ALUMINUM FT-LBS [IN-LBS]
1/2"	5/16-18 x 1.25	17 ft-lbs.	200 in-lbs.	12 [130]
3/4"	3/8-16 x 1.25	30 ft-lbs.	360 in-lbs.	20 [240]
1"	3/8-16 x 1.25	46 ft-lbs.	550 in-lbs.	30 [360]
1-1/4"	1/2-13 x 1.75	69 ft-lbs.	830 in-lbs.	45 [540]
1-1/2"	5/8-11 x 2.25	125 ft-lbs.	1500 in-lbs.	82 [980]
2"	3/4-10 x 2.75	209 ft-lbs.	2510 in-lbs.	136 [1640]

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COLD WEATHER WARMUP PROCEDURE

When ambient air temperature is cold (below 0 degrees F), it is necessary to warm up the unit's hydraulic oil before you start your daily route operation, check the oil level, or adjust hydraulic pressure settings. The hydraulic oil is sufficiently warmed when the temperature is between 120° and 160°F.

⚠ WARNING

Moving parts on the unit are dangerous. Serious injury or death can occur if a person is struck by the equipment. Clear all people from the area before you operate the unit.

Follow the steps below to warm up the hydraulic oil.

1. START the TRUCK and let the engine idle.
2. APPLY the PARKING BRAKE and make sure it holds.
3. ENGAGE the HYDRAULIC PUMP for approximately five minutes.
4. MAKE SURE the AREA IS CLEAR of all unnecessary people BEFORE you operate the controls.
5. OPERATE the PACKER EXTEND and PACKER RETRACT functions through ten (10) cycles while the engine idles. See the Operator's Manual for operation instructions.
6. Make sure the oil temperature on the site gauge is between 120° and 160°F. If not, repeat step 5.
7. Check for fluid leaks. Repair if necessary.
8. The unit is now ready to go on route.

BATTERY DISCONNECT SWITCH

The battery box is typically located on the streetside of the chassis frame near the front of the body, however it can be mounted at a different location on different chassis. Become familiar with the location of the battery box and battery disconnect switch on your unit.

1. You must turn the battery disconnect switch to the OFF position whenever the unit is shut off for any length of time – especially when the unit will be left unattended.
2. You must turn the battery disconnect switch to the ON position whenever you will use the unit.
3. You must check the position of the battery disconnect switch as part of the daily inspection.

NOTICE

Battery cables must be securely anchored and not rubbing other equipment. Cable insulation must be free of damage and abrasion. Inspect weekly.

NOTICE

Always disconnect the battery before welding on the chassis or body.

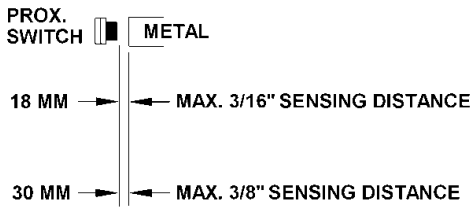
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PROXIMITY SWITCH TROUBLESHOOTING

When one or more of a unit's functions do not operate properly and there are proximity switches in the circuits of the unit for these functions, refer to the following table as a guide to find the problem(s).

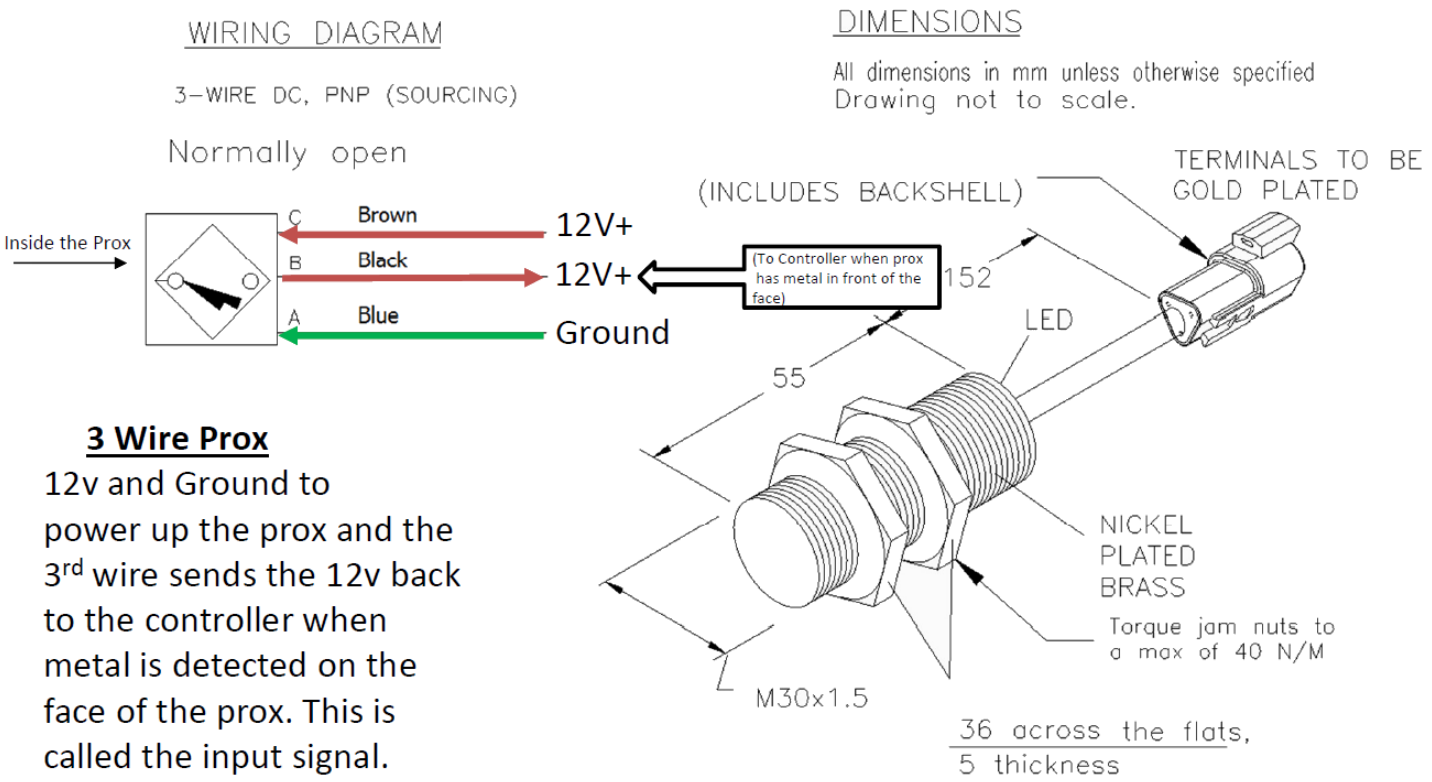
NOTICE

Heil proximity switches have a Light Emitting Diode (LED) on the switch to indicate that the switch is sensing metal. The light changes color when the switch senses metal. Green indicates the switch is ON. Yellow indicates the switch senses metal. Some proximity switches only have the yellow light.

Proximity Switch Troubleshooting Table	
Probable Cause	Remedy
Loose or corroded electrical connections.	Replace the electrical connections.
Damaged Switch A. Cracked Ferrite core causing the fine internal wire to break. B. Cracked Ferrite core – but wire is not broken – the sensitivity of switch will increase which causes sensing distance to increase or switch work intermittently as the temperature changes.	• DO NOT strike switch to make it work. • DO NOT damage the switch when you adjust it. • DO NOT adjust switch too close to the metal it is sensing.
Voltage spikes from truck chassis electrical system will break down the internal electronics of the proximity switch.	1. Make sure the power source from the chassis manufacturer is clean. 2. The body electrical system is protected from voltage spikes.
Improper Sensing Range	Adjust proximity switches to sense metal as follows: 
If the controller input light stays on when a switch is unplugged (the signal wire is carrying +12V DC)	Check the proximity switch electrical circuits for the source of the problem.
If proximity switch LED light is NOT ON.	1. Check the fuse relay block (Half/Packs with IFM controllers). The fuse/relay box is located in the cab. Or Check the in-line fuses (Side Loaders with IFM controllers). The in-line fuses are located in the cab. 2. Unplug proximity switch. 3. Check the power wire (terminal C) for +12 VDC with a multi-meter. 4. Check ground signal with multi-meter for continuity to chassis ground. 5. Check the signal wire for continuity to appropriate controller input terminal. See Service Manual. 6. If all three (3) wires are good, replace the proximity switch.

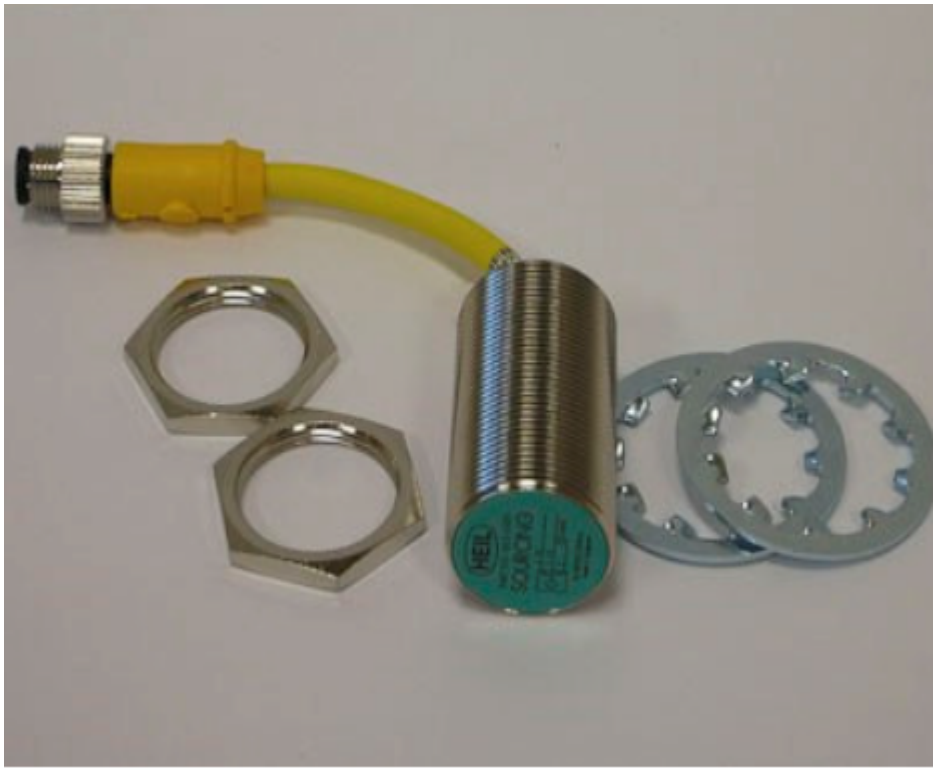
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PROXIMITY SWITCH TROUBLESHOOTING (CONTINUED)



3 Wire Prox

12v and Ground to power up the prox and the 3rd wire sends the 12v back to the controller when metal is detected on the face of the prox. This is called the input signal.

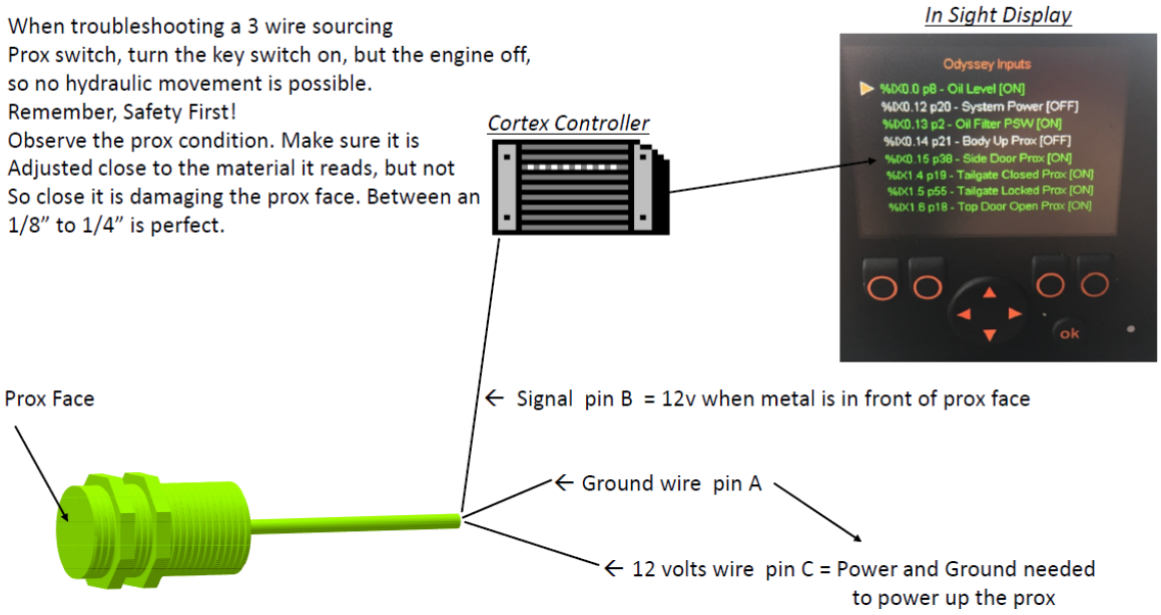


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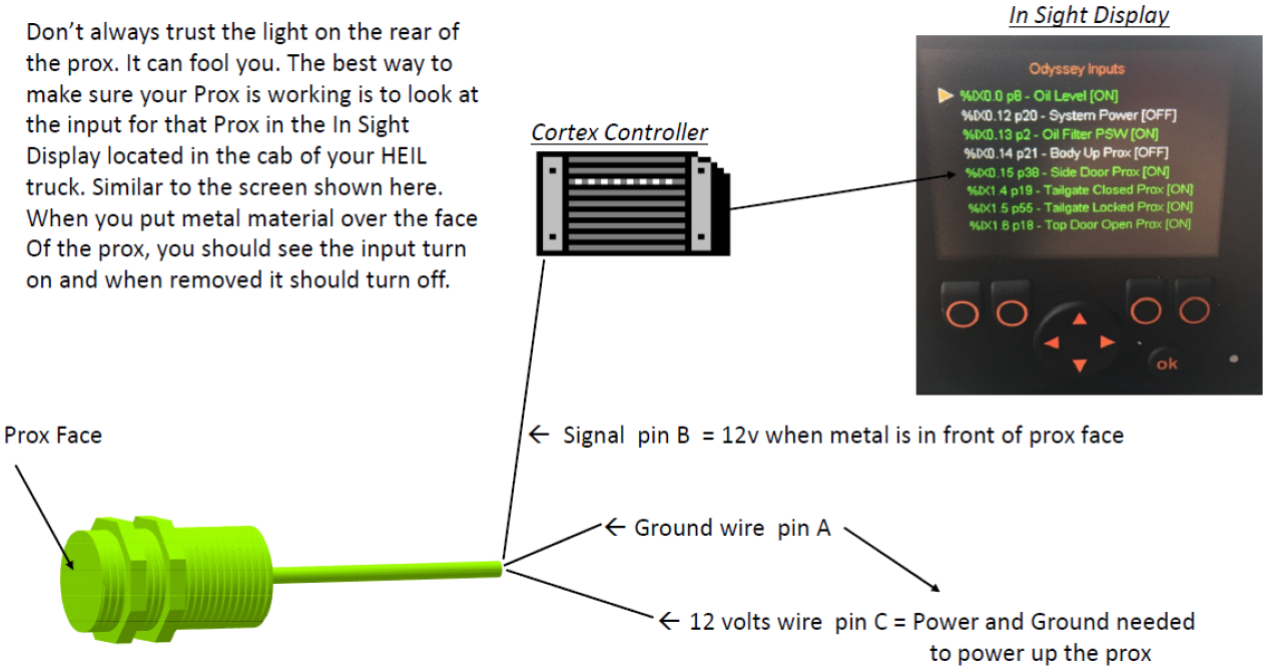
PROXIMITY SWITCH TROUBLESHOOTING (CONTINUED)

Testing Prox Switches Using Your Controller

When troubleshooting a 3 wire sourcing Prox switch, turn the key switch on, but the engine off, so no hydraulic movement is possible. Remember, Safety First!
Observe the prox condition. Make sure it is Adjusted close to the material it reads, but not So close it is damaging the prox face. Between an 1/8" to 1/4" is perfect.

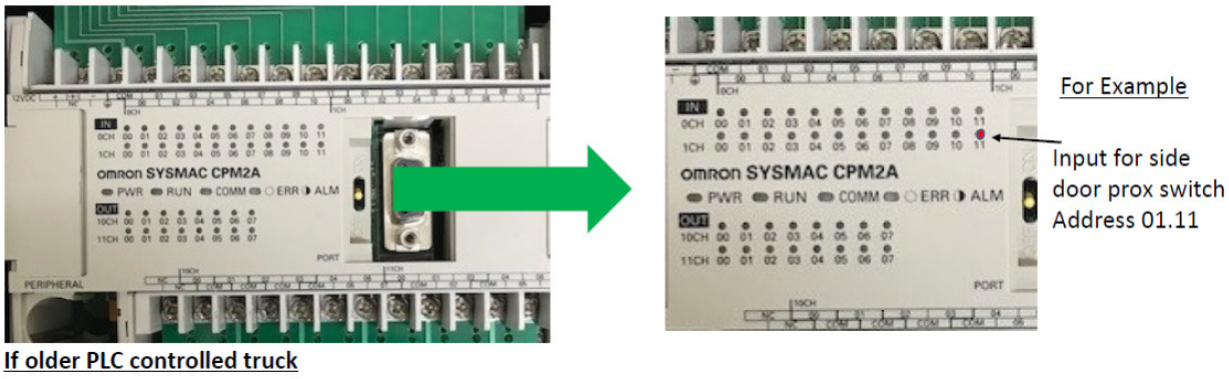


Don't always trust the light on the rear of the prox. It can fool you. The best way to make sure your Prox is working is to look at the input for that Prox in the In Sight Display located in the cab of your HEIL truck. Similar to the screen shown here. When you put metal material over the face Of the prox, you should see the input turn on and when removed it should turn off.

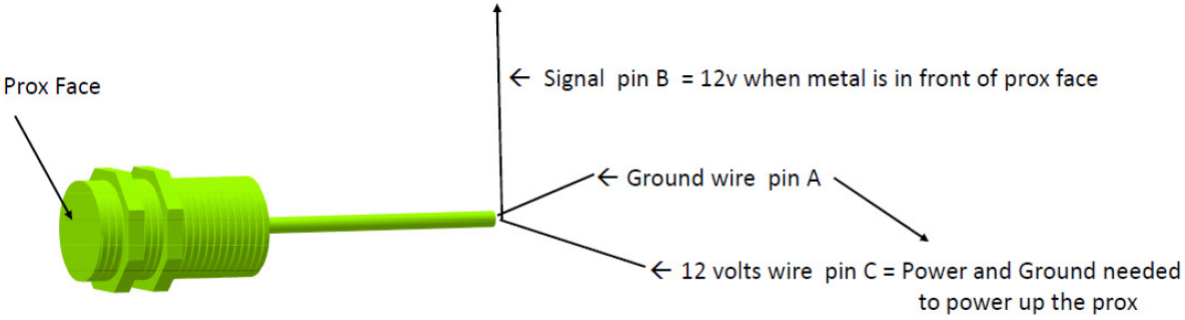


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PROXIMITY SWITCH TROUBLESHOOTING (CONTINUED)



If older PLC controlled truck



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DECALS ON THE UNIT

Make sure you can read all hazard and instruction decals. Clean decals if you cannot read the words. See for directions on cleaning decals.

Replace any decal that is damaged, missing, or is not readable.

When you replace a part that has a decal, make sure a new decal is installed on the new part. See the Parts and Service manual for a complete decal kit and individual decals. Order the decal kit or individual decals from your Heil Dealer or from Heil.

DECAL CARE

It is important that the decals are properly cleaned to make sure that they are readable and do not come off the unit. Use the following steps to clean the decals.

A. General Instructions

Following these instructions helps the decals adhere longer.

- Wash the decals with a blend of mild car wash detergent and clean water
- Rinse with clean water
- Let the vehicle air-dry or dry with a micro-fiber cloth
- Do not allow fuels to stay in contact with the decal for an extended period of time. Remove the fuel contamination as quickly as possible
- Do not use carnauba-based wax over the decals
- Do not use a mechanical brush while washing the decals.

B. Pressure Washer Precautions

Pressure washing can cause damage to decals. It can cause the edges of the decals to lift and peel the decal away from the unit. Over time, the decal can fade, crack or chip away.

Use pressure washing only when other cleaning methods are not effective. If you use a pressure washer, use the following precautions.

- Spray nozzle opening: 40° wide pattern
- Spray angle: 65° from vehicle’s body (do not use sharp angles – this can lift the decals from the unit)
- Distance of nozzle to decal: 38 cm minimum
- Water pressure: <= 5.5 MPa
- Length of time: not more than 30 sec.
- NEVER use a “turbo pressure nozzle”.

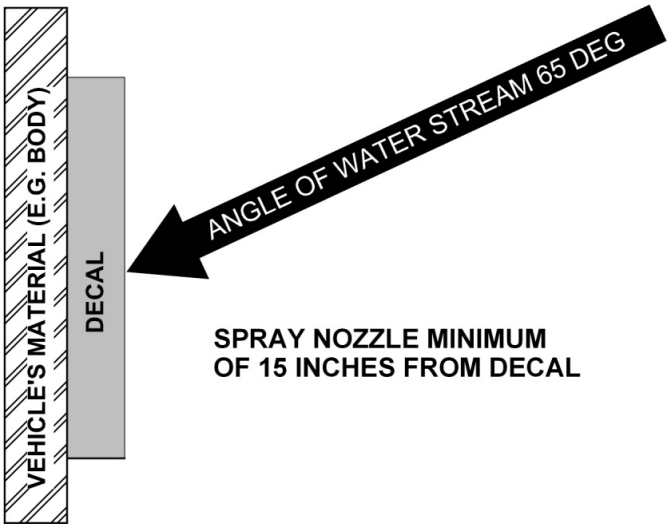
C. Remove Difficult Debris

When normal cleaning procedures do not remove difficult debris from the decals, try the following:

- Spot clean the decal with Isopropyl Alcohol and a micro-fiber cloth (rag)
- If these methods do not work on a problem area, call a Heil Dealer or Heil Customer Support.

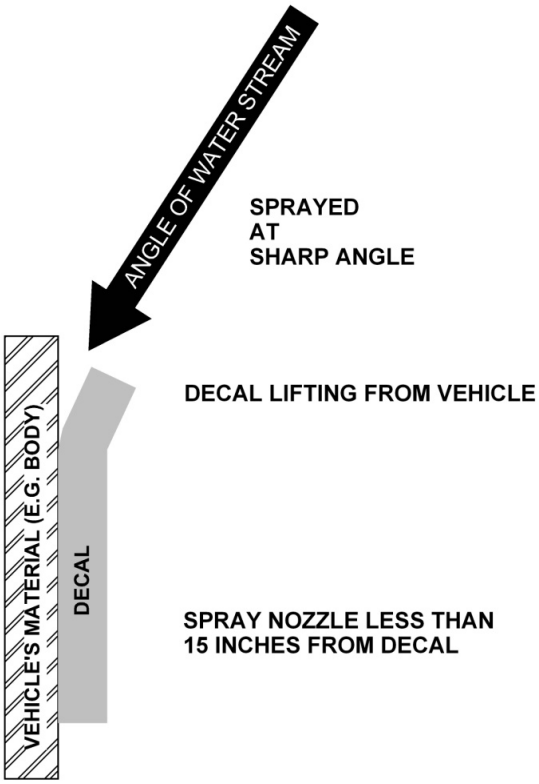
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DECAL CARE (CONTINUED)



RECOMMENDED TECHNIQUE

Figure 5. Recommended Technique

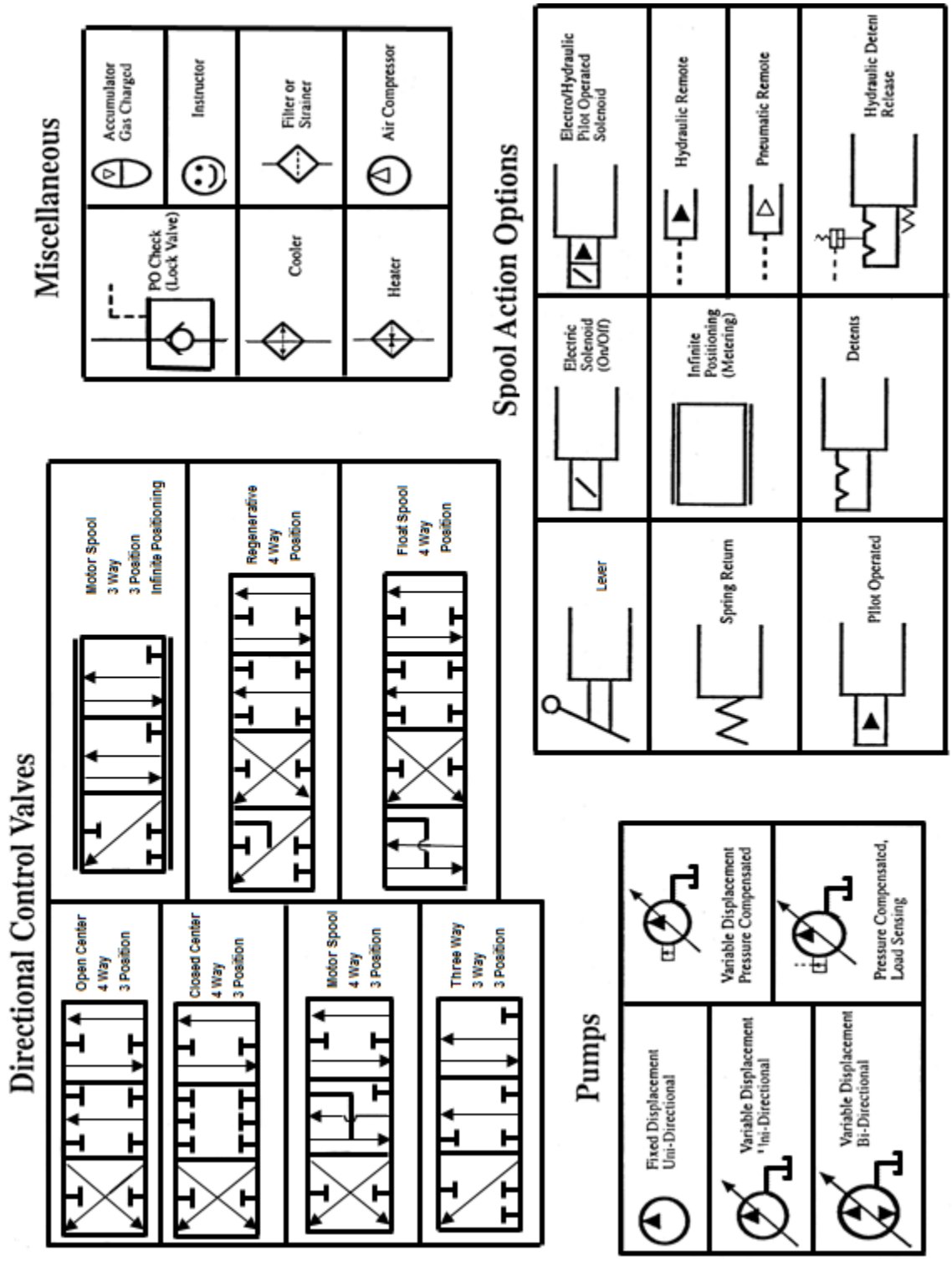


INCORRECT TECHNIQUE

Figure 6. Incorrect Technique

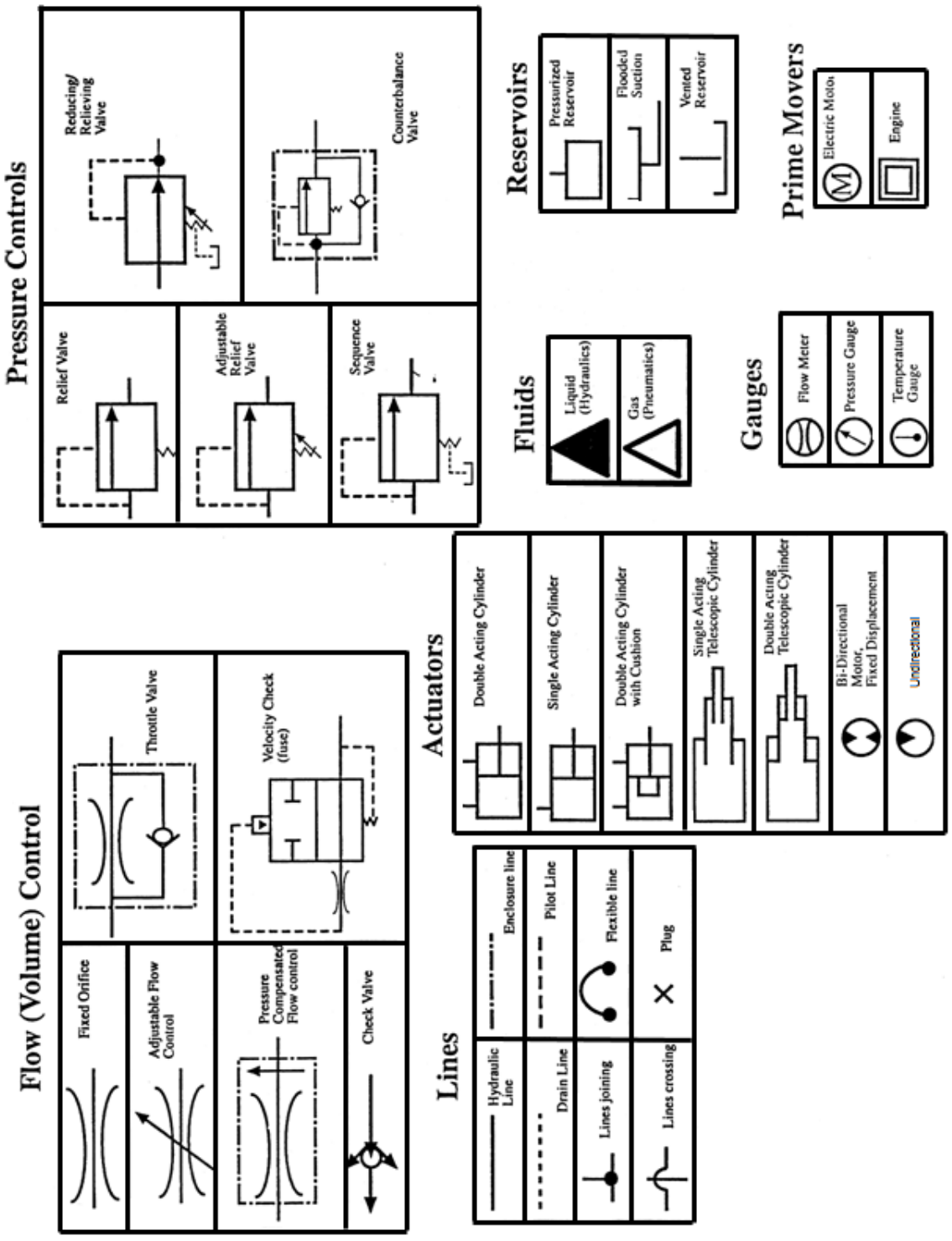
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HYDRAULIC SYMBOLS



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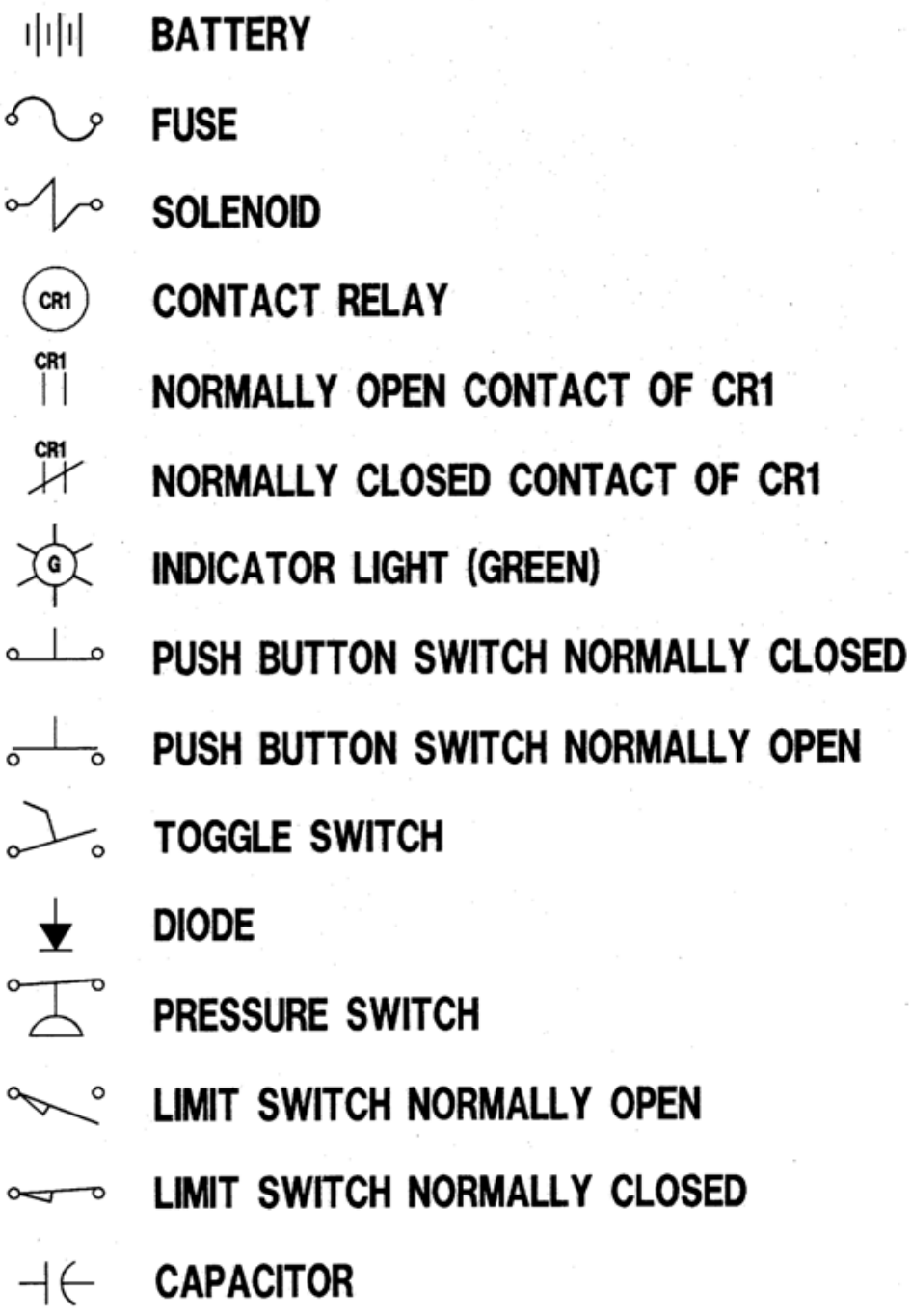
HYDRAULIC SYMBOLS (CONTINUED)



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ELECTRICAL SYMBOLS

SYMBOL DEFINITIONS



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SECTION 2
PUMPS

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HYDRAULIC PUMP CONTROL

The pump system consists of a tandem hydraulic pump driven by either a transmission mounted PTO or engine crank shift (front mount pump). There can be up to three control solenoids in this system Pump #1 (Lift Pump), Pump #2 (Body Pump) and Hot Shift PTO (if equipped). Each solenoid is individually controlled by a dedicated output from the Cab Controller.

To enable the hydraulic pump control, the System Power switch must be ON, then press the Pump button on the Joystick or the Pump rocker switch on the control panel.

A. Hot Shift PTO Solenoid (if equipped)

This solenoid engages the transmission mounted hot shift PTO and will activate under the following conditions.

Condition #1

- ON = with Pump Control Enabled AND Vehicle Speed < 15mph to engage.

B. Pump #1 Solenoid (Lift Pump)

This solenoid engages the lift pump and will activate under the following conditions.

Condition #1 (on route operation)

- ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Body Hoist Down AND Vehicle Road Speed < 7mph (default) AND Service Brake applied.Condition #2 (stationary operation)
- ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Body Hoist Down AND Vehicle Road Speed < 7mph (default) AND Transmission in Neutral

Condition #2 (stationary operation)

- ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Body Hoist
- Down AND Vehicle Road Speed < 7mph (default) AND Transmission in Neutral

Condition #3 (stow lift on the fly)

- ON = Pump Control Enabled AND Body Hoist Down AND Lift Stow Option ON AND (Grabber Closed OR Lift Extended) AND Grabber Open Button pressed

Condition #4 (service mode)

- ON = with Pump Control Enabled AND Engine Speed < 900rpm AND Service Mode ON AND Vehicle Road Speed < 7mph (default) AND Transmission in Neutral

C. Pump #2 Solenoid (Body Pump)

This solenoid engages the body pump and will activate under the following conditions.

Condition #1 (body operation)

- ON = with Pump Control Enabled AND Engine Speed < 1500rpm to engage AND Engine Speed < 1800rpm to retain engagement.

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TANDEM O.I.G.A.I. PUMP

Front Loaders, Rear Loaders, Recycle 2000, and Liberty

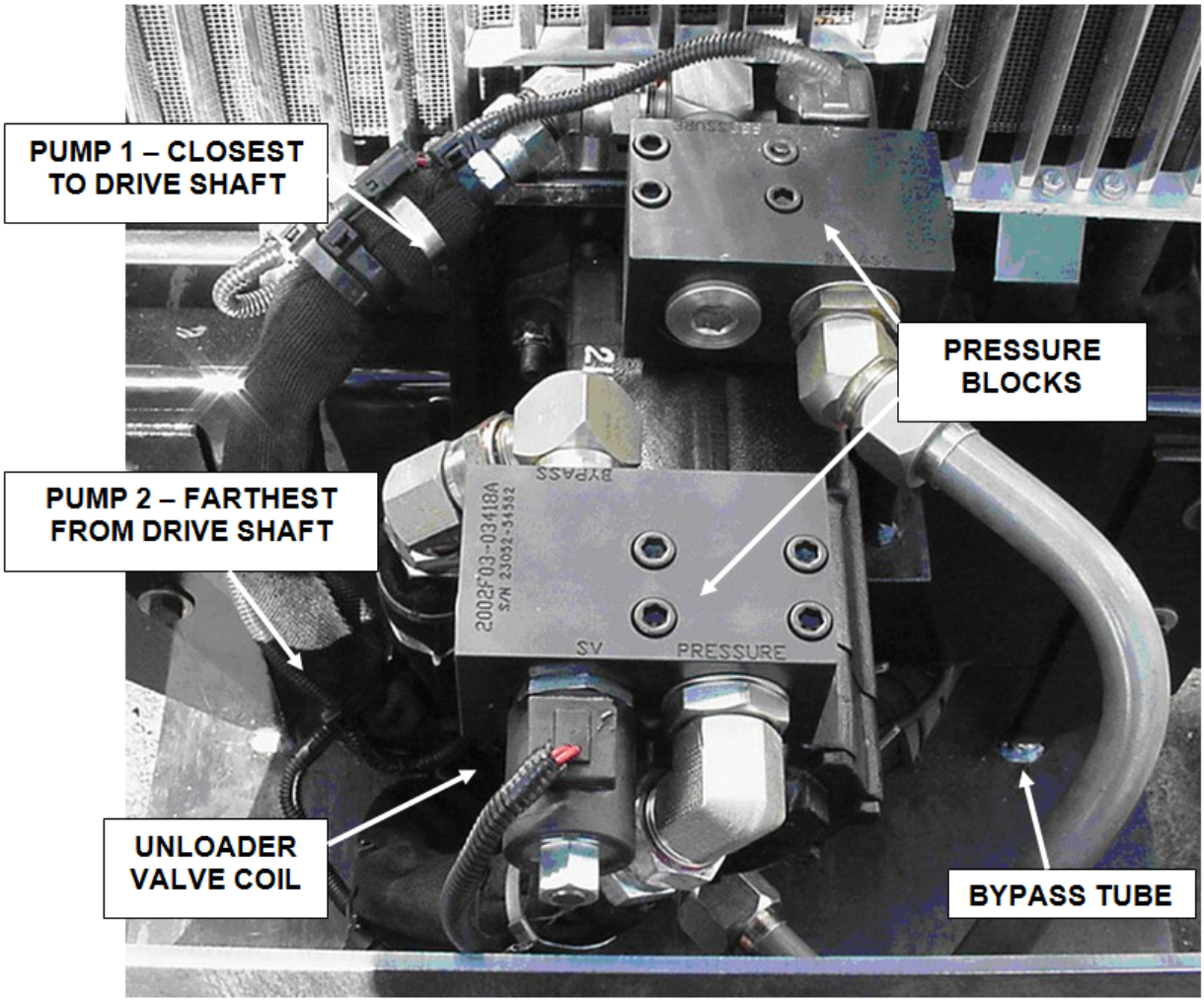


Figure 7. Tandem O.I.G.A.I. Pump

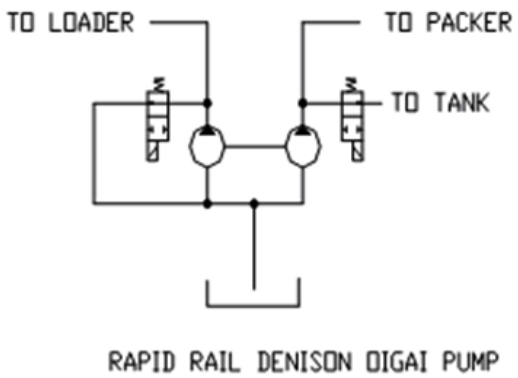


Figure 8.

This is the Hydraulic Controls Operate-In-Gear-At-Idle (OIGAI) System. The pump section (pump 1) closest to the input shaft operates the lift and shuts off first. The pump section (pump 2) farthest from the input shaft operates the packer and stays on at higher RPMs.

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TANDEM VANE PUMP O.I.G.A.I. HYDRAULIC SYSTEM TROUBLESHOOTING

The Operate-in-Gear-at-Idle (OIGAI) system is designed to perform the loading operations at standard idle speed. It is comprised of two major components, the monoblock tandem vane pump and attached unloader valve assembly.

On the OIGAI REL systems the P1 closest to the pump input shaft while the P2 farthest from the input shaft supplies flow to the complete hydraulic systems.

The unloader valve assemblies consist of a manifold (pressure) block, a normally open (N.O. or NO) cartridge valve and a 12VDC-solenoid coil. In operation mode, the current is supplied to the valve coil causing the valve to close, forcing pump flow to the hydraulic circuit. In bypass mode, the coil is de-energized causing the valve to open, allowing the oil to re-circulate either back to tank or to the pump inlet.

A. Troubleshooting

The symptoms of a problem in the pump circuit are either slow operation or no operation at all.

There are three primary causes for the pump circuit to not operate properly:

- Low or no voltage to the unloader valve coil.
- Malfunction in the unloader valve assembly.
- Internal problem with the pump.

Perform the following test after finding that there is insufficient or no flow to the loader and/or body valves.

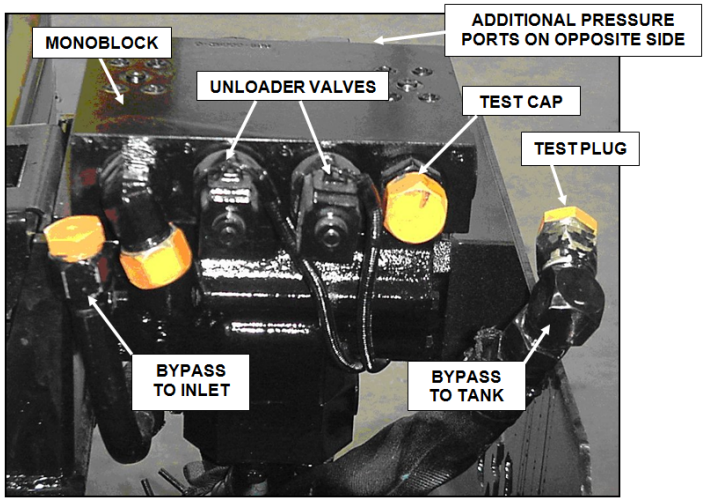
1. Check the Electrical Supply to the Unloader Valve Coils
   a. With the system turned on and the engine operating at idle, test the voltage at the coil. It should read a minimum of 10 VDC. If proper voltage is present and the problem persists, proceed to step 2. If the voltage is below 10 VDC, check the electrical system for problems that can cause a drop or loss of voltage to the unloader valve solenoid coil. Some examples are a broken or shorted wire, blown fuse, fault in the side door switch (if equipped), no alternator input or a failed PLC calibration.
   b. Use an ohm meter to check resistance in the coil. If the measurement is less than 5 ohms or more than 20 then the circuit coil is damaged. If the coil is damaged, replace the coil.
2. Eliminate the Unloader Valve from the Circuit
   a. With the engine off, Cap and plug the tube connection for the bypass to the pump inlet. This forces all oil to the hydraulic circuits as if the pump is on. (NOTE: Pump control switches in the cab are no longer effective.)
   b. Restart the truck and test the functions. If the hydraulic system functions return to normal operation (speed and pressure within specifications), replace or repair the unloader assembly.

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TANDEM VANE PUMP O.I.G.A.I. HYDRAULIC SYSTEM TROUBLESHOOTING (CONTINUED)

NOTICE

If flow is present check the main relief valves for proper adjustment and operation.



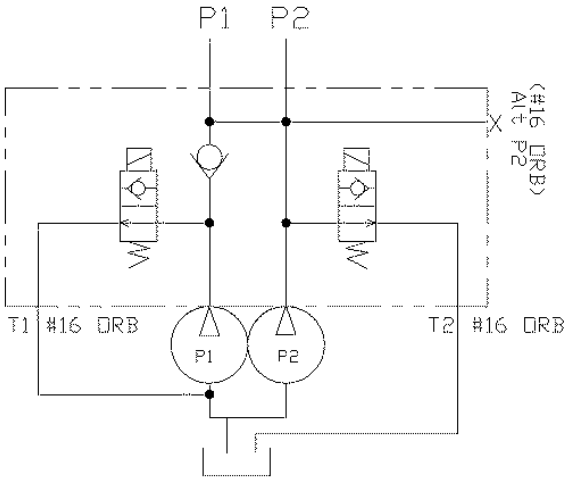


Figure 9.

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SECTION 3
LIFT ARM

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NOMENCLATURE

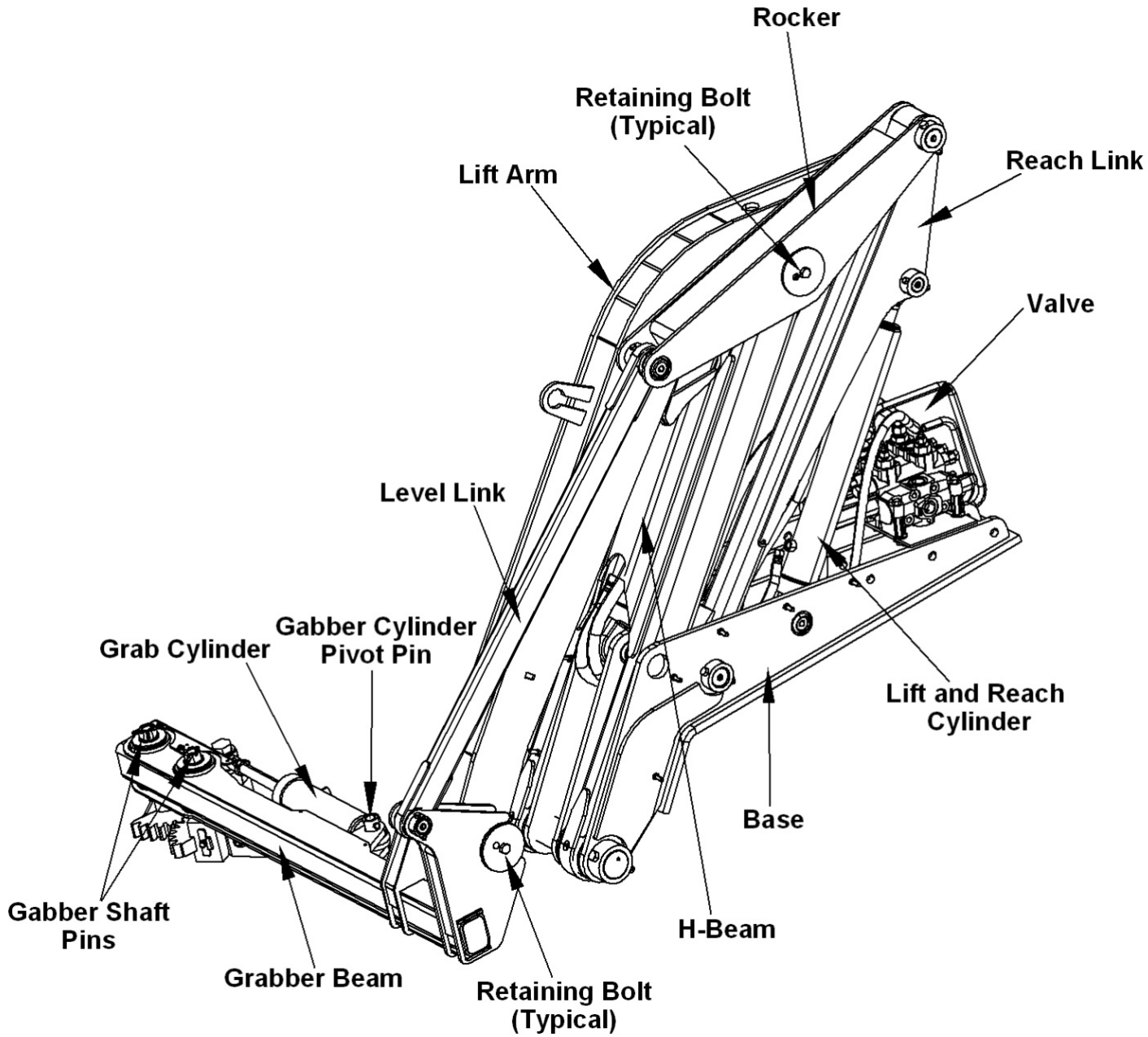


Figure 10. Lift Arm Nomenclature

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SPECIFICATIONS

NOTICE

All pressures are +/- 100 PSI at operating temperature. See **Lift Control Valve Pressure Adjustments** 55 and **Relief Valve Adjustment** 60 pages for valve adjustment procedures.

A. Hydraulic Cylinders

Lift and Reach	3.1" Bore X 16" Stroke
Grab	3.1" Bore X 8" Stroke
Level	2.48" X 14.48" Stroke

B. Body

Main Relief	2500 PSI
CNrG Tailgate Raise	1500 PSI
Top Door or Hopper Cover	1500 PSI

C. Lift Valve

Main Relief Valve Pressure	2300 PSI
Reach In/Out	2500/1250 PSI
Reach Relief In/Out	2500/1250 PSI
Arm Up/Down	2500/1250 PSI
Packer Pressure Switch	2200 PSI

D. Grabber

Relief	1250/1250 PSI

E. Cycle Times

Lift Cycle Time Standard Python	7 - 9 Seconds
Packer Cycle Time	12-16 Seconds

F. Lift Capacity (@700 RPM idle)

Standard Python - Less than 6 Feet	1250 lbs
Standard Python - 6 Feet and Beyond	645 lbs
Hydraulic Pump	31 GPM @ 750 RPM @ 2500 PSI

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PYTHON LIFT LUBRICATION GUIDE

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

NOTICE

If a grease zerk is missing or damaged, replace as necessary.

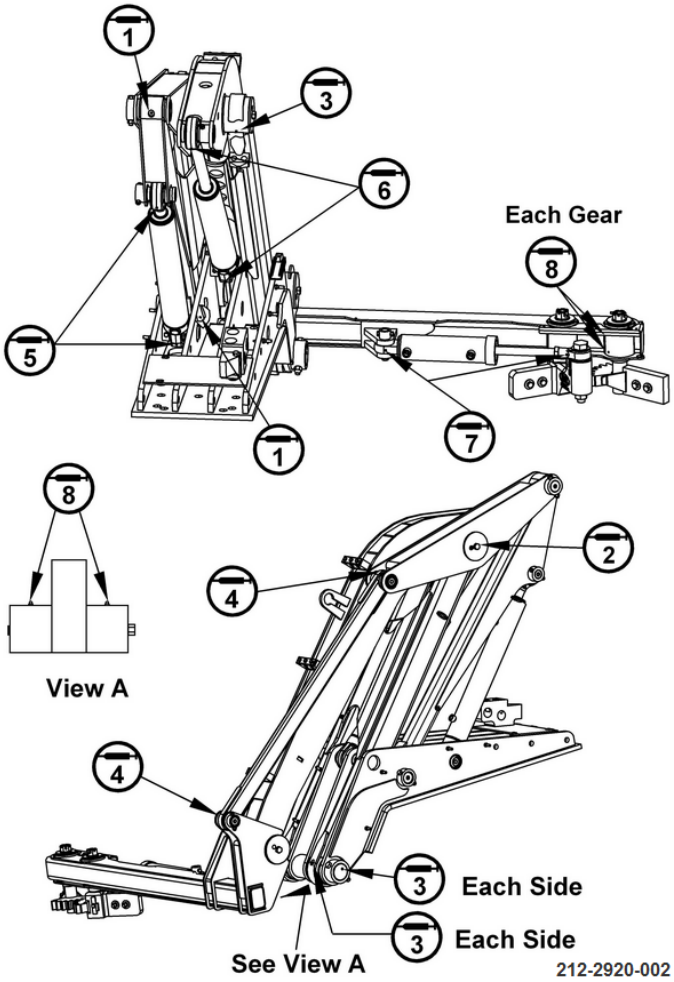


Figure 11. Python Lift Lubrication Guide

REF NO.	DESCRIPTION	QTY.	FREQUENCY
1	Reach Pivot Link	4	Every 20 Hours
2	Rocker Assembly	1	Every 20 Hours
3	H-Beam Assembly	6	Every 20 Hours
4	Level Link	2	Every 20 Hours
5	Reach Cylinder	2	Every 20 Hours
6	Lift Cylinder	2	Every 20 Hours
7	Grabber Cylinder	2	Every 20 Hours
8	Grabber Beam	4	Every 20 Hours

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LIFT ARM PREVENTIVE MAINTENANCE CHART

Maintenance performed on a regular schedule is preventive maintenance. Normal maintenance intervals are based on an 8-hour day and average operating conditions. Severe use or adverse conditions make it necessary to do this maintenance more frequently.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack (https://www.heil.com/heil-service-shack)**.

REF NO.	ACTIVITY	INTERVAL	SERVICE/CHECK
1	Grease Lift	(20 hrs)	See the **Python Lift Lubrication Guide** 46 or the lubrication decal on the lift arm.
2	Check Pin Retaining Bolts – Tighten	Weekly (40 hrs)	Check for broken bolts. This may indicate bearing or pin damage. Replace the bolt and the bearing and pin retained by the bolt. Use anti-seize compound on any pins or bearings that are replaced.
3	Hydraulic Plumbing	Weekly (40 hrs)	Check for damage, worn, or leaking hoses, tubes or fittings. Replace as necessary. NOTE: Do not replace steel tubes with hoses.
4	Cycle Times (900 maximum RPM while operating lift)	Weekly (40 hrs)	Check lift operation. Normal engine RPMs should not exceed 900. The lift operates at approximately 7 – 8 second cycle time. Cycle times includes grab, lift, lower and release.
5	Check Mounts	Weekly (40 hrs)	• Make sure chassis rail is undamaged. • Make sure chassis bolts are present and tight. • Check brackets for cracks. • Make sure lift bolts are present and secure.
6	Check Lift Mount Base Bolts	Weekly (40 hrs)	Visually inspect mounting bolts for security and movement. Check the nuts and bolts to make sure the weld is secure. See **Check Lift and Torque Mount Base Bolts** 48 for bolt replacement instructions.
7	Lift Stress or Weld Cracks	Weekly (40 hrs)	Check lift for any structural cracks or cracks in the areas of welds. Cracks must be ground out and repaired. If cracking continues replace the affected parts. See **Lift and Weld Cracks Decision Tree** 61 in this section.
8	Grabber Assembly with Belt	Weekly (40 hrs)	Inspect belt condition for wear, cuts or damage. Replace if present.
9	Hoses	Weekly (40 hrs)	Check for tears, wear or holes and replace as necessary.
10	Fiber Guards	Weekly (40 hrs)	Check for tears or holes and replace as necessary.
11	Shaft Retainer Bolts	Monthly (200 hrs)	• Make sure both pins are present and tight. If one pin fails, replace both pins. • Make sure the collar key is present. If one fails.
12	Grabber Cylinder Pivot Bolt	Monthly (200 hrs)	Check for tightness.
13	Hydraulic Relief Valves	Twice Yearly (1000 hrs)	Check main relief and port reliefs for proper settings. For more information see **Lift Control Valve Pressure Adjustments** 55 in this section.

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CHECK LIFT AND TORQUE MOUNT BASE BOLTS

When the Lift Base Mounting bolts weld is cracked, you must replace the bolts and nuts. The goal of this torque method is to achieve a 59,000lb clamp load consistently. A torque multiplier is not accurate enough at the values required. This method (torque/turn) is accurate and repeatable.

This method is required for field installation where proper torquing equipment may not be available. It also allows proper bolt torquing using standard wrenches and “cheater” bars.

A. Tools Required

Quantity	Tool
1	Torque wrench (1” and 5/8” sockets)
1	Combination wrench (1” and 5/8”)
1	Welding equipment
1	Personal protective equipment

B. Parts Required

See Parts Manual for replacement parts.

C. Before Replacing Lift Mount Bolts

1. Visually inspect the lift mount bolts on both the street side and curb side. See the illustration for locations.
2. Make sure the bolts are secure and there is no movement.
3. Make sure welded bolts do not have cracks.
4. If any lift mount bolt is loose, cracked or broken, replace all bolts. Use only the parts specified. Lower grade parts are not acceptable.
5. After torquing, bolts and nuts cannot be reused. To install and torque bolts, complete section D below.

D. Replace Lift Mount Bolts

1. Make sure the threads on both the bolt and nut are dry (no lubrication) before installation.
2. Install bolt into lift base and lift mount brackets.
3. Thread nuts onto bolts and hand tighten.

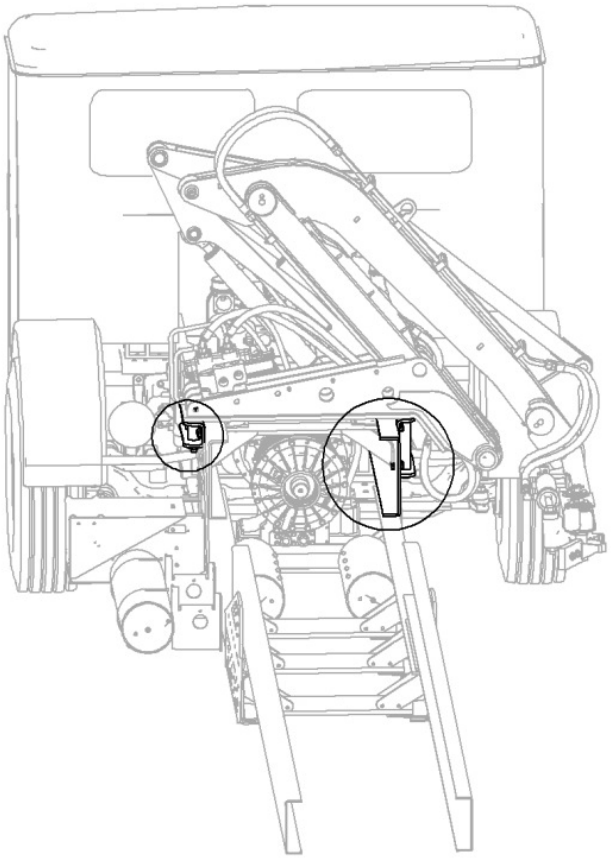


Figure 12. Lift Mount Base

4. Use a torque wrench with a combination wrench to tighten the nut to 100 ft-lbs., holding bolt-head and turning nut.
5. Mark nut, washer and lift base with a paint market at a corner.
6. Count around 3-1/2 nut flats and mark the center of the nut, washer and lift base.

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CHECK LIFT AND TORQUE MOUNT BASE BOLTS (CONTINUED)

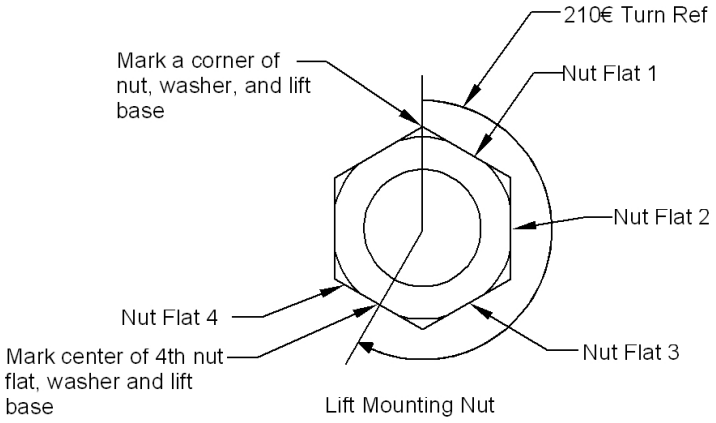


Figure 13. Lift Mount Bolt

7. Use a wrench and extension handle to turn the nut's marked corner to the second mark at the center of the fourth nut flat. It is critical that the head of the bolt is held in place and not allowed to rotate further. Brace the wrench handle as necessary.
8. Weld the nut to the bolt as specified. Welding the nut prevents the nut from loosening and prevents the bolt and nut from being reused.
9. Do not remove paint marks

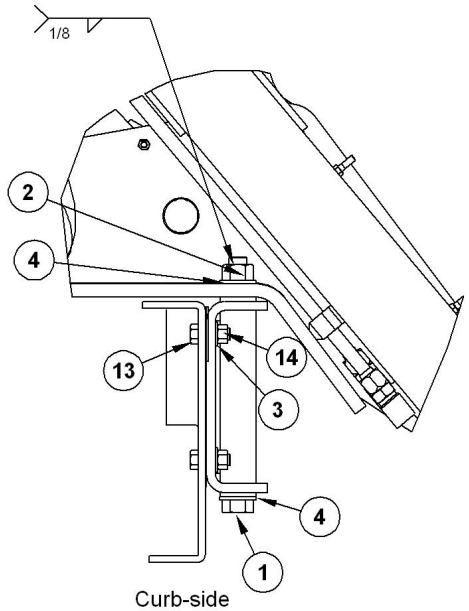


Figure 14. Lift Mount Bolt Location

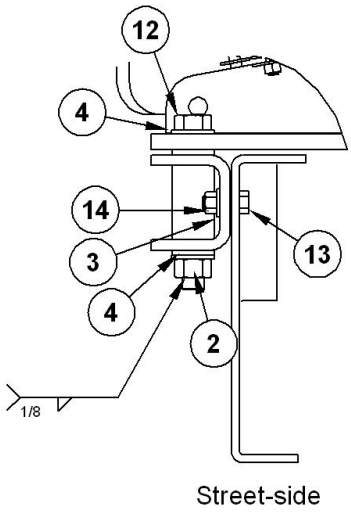


Figure 15. Lift Mount Bolt Location

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UNIVERSAL BELT AND TRI-CUFF GRABBER ADJUSTMENTS

A. 60-90 Gallon Belt Grabbers

Adjust the grabber belt length so the distance between the roller on the inner arm and the outside roller is 30” (+/- 1”). See illustration below.

NOTICE

The grabber belt holes on the inside end of the belt are farther apart to make longer adjustments. The holes on the outside end of the belt are closer together to make shorter adjustments.

NOTICE

When the grabbers are used with the Python Lift, adjust the outer rollers so that they do not touch each other when the grabbers are completely closed.

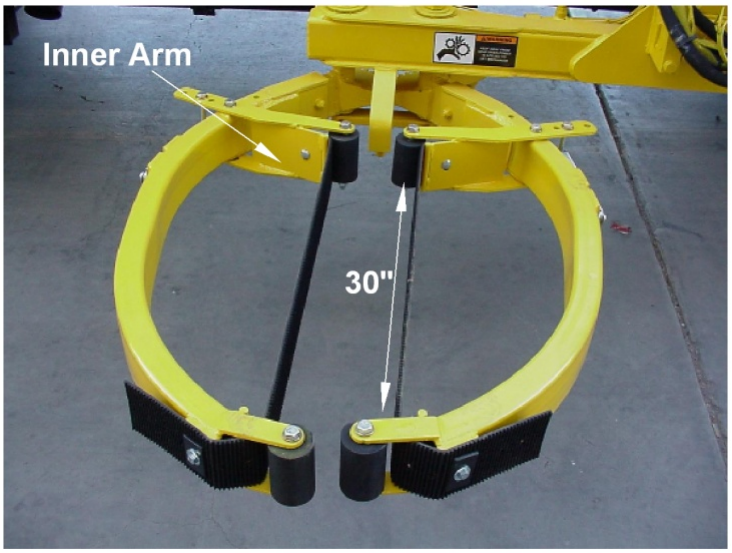


Figure 16. 60-90 Gallon Belt Grabbers

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UNIVERSAL BELT AND TRI-CUFF GRABBER ADJUSTMENTS (CONTINUED)

B. 90-300 Gallon Belt Grabbers

Adjust the grabber belt length so the distance between the inner arm and the outside roller is approximate 30” (+/- 1”) to obtain a firm grip for smaller containers. The total overall length of the grabber belt must be set to obtain a firm grip for larger containers. See illustration below.

NOTICE

Do not adjust the total overall belt length too far as this may cause the grabber belt to touch or wear against the outer arm.

NOTICE

When used with the Python lift the grabbers should be adjusted so the outer rollers do not touch each other when the grabbers are completely closed.

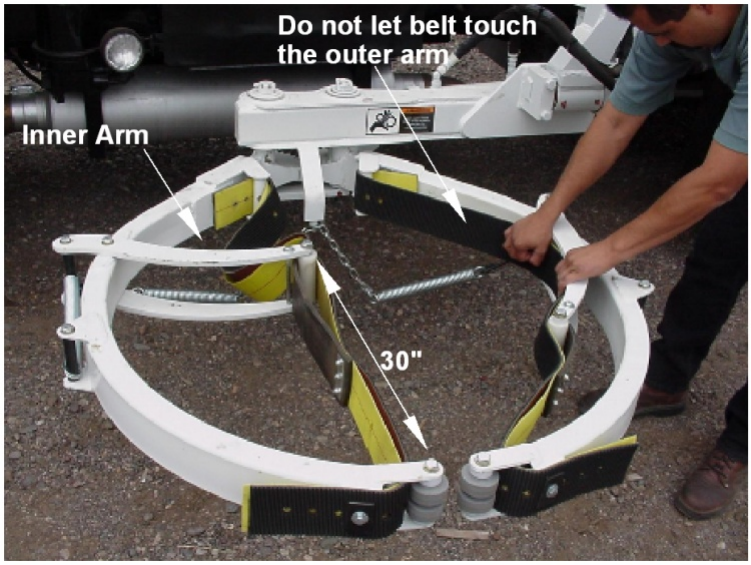


Figure 17. 90-300 Gallon Belt Grabbers

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UNIVERSAL BELT AND TRI-CUFF GRABBER ADJUSTMENTS (CONTINUED)

C. 30-110 Gallon Tri-Cuff Belt Grabbers

Adjust the grabber belt length so the distance between the roller on the inner arm and the outside roller is 30” (+/- 1”). See illustration below.

NOTICE

The grabber belt holes on the inside end of the belt are farther apart to make longer adjustments. The holes on the outside end of the belt are closer together to make shorter adjustments.

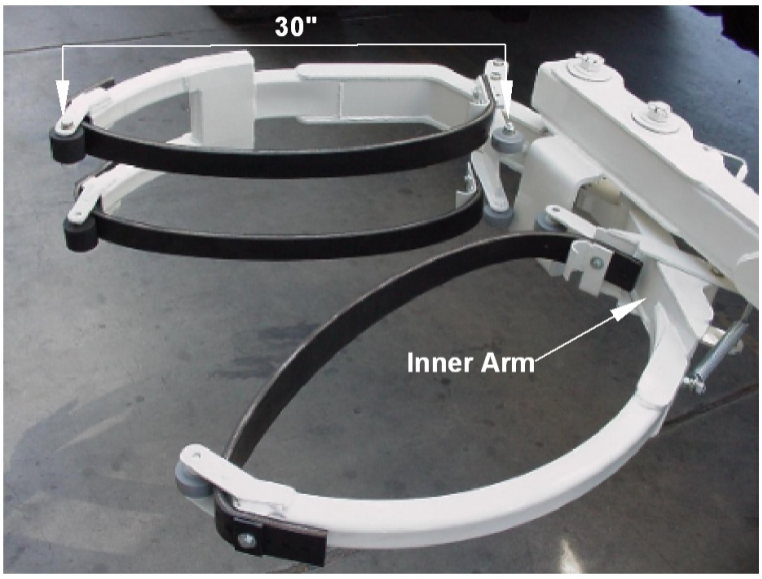


Figure 18. 30-110 Gallon Tri-Cuff Belt Grabbers

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LIFT-STOWED AND GRABBERS OPEN PROXIMITY SWITCHES

Adjust the proximity switches to deactivate if grabber or arms are extended outside the width of the vehicle. You will need a 15/16" wrench. The grabbers open proximity switch should be adjusted so that it is activated when the grabbers are fully open. To make adjustments to the lift-stowed (lift-in) proximity switch, you will need a 7/16" wrench. The lift-stowed proximity switch should be adjusted so that it is activated when the lift arm is fully stowed or retracted. See the figure below.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack (https://www.heil.com/heil-service-shack)**.



Figure 19. Lift Arm Proximity Switches

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LIFT CONTROL VALVE

Some key areas are shown below on the standard lift control valve. The Python Lift uses a precision-machined parallel control valve that does not have interchangeable spools. Each spool is matched to the individual bore. See **Lift Control Valve Pressure Adjustments** 55.

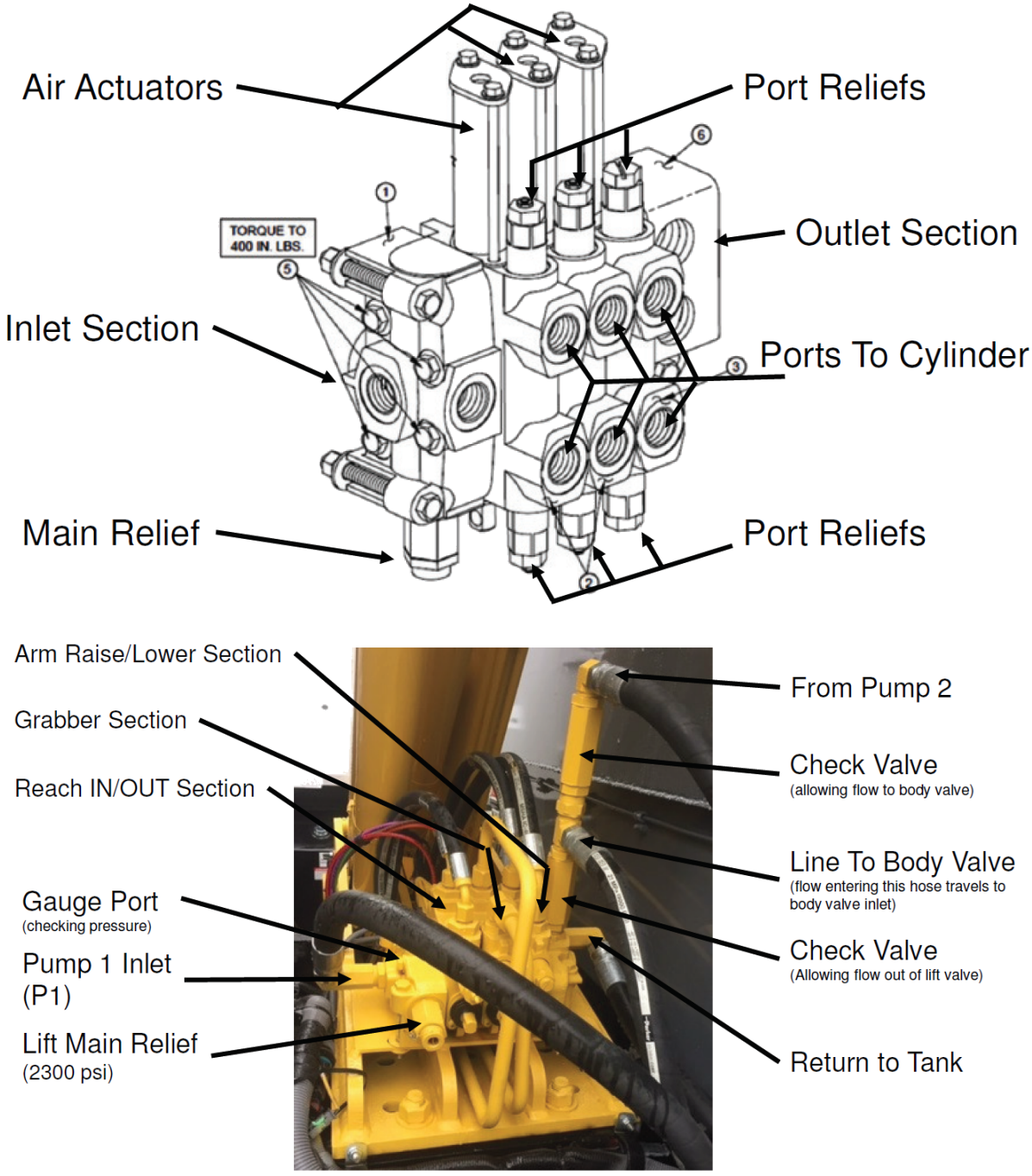


Figure 20. Python Lift Control Valve

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LIFT CONTROL VALVE PRESSURE ADJUSTMENTS

The lift control valve has adjustable hydraulic pressure settings that should be checked twice yearly (1000 hrs). All lift valve pressure adjustments are made with the engine running at idle. In general, hydraulic pressures are normally increased by turning the pressure adjusting screw clockwise. Follow the steps below to adjust the pressures on the Python lift arm.

Watch the **Preventive Arm Lift Maintenance** video on the **Heil Service Shack (https://www.heil.com/heil-service-shack)**.

Quantity	Tool
1	Personal protective equipment
1	Pressure gauge (0-5000)
1	1-1/2" Wrench
1	15/16" Wrench
1	7/16" Wrench
1	1/8" Wrench
1	1/2" Hex Wrench
1	Wire cutters
1	Slotted Screwdriver

⚠ WARNING

Moving equipment can be dangerous to bystanders. Serious injury or death can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

⚠ WARNING

The hydraulic fluid may be under pressure and may spray while you open the connection. Hydraulic fluid may cause damage to your eyes, hands or skin. Wear protective eye glasses, gloves and other clothing as necessary to protect you from the hydraulic fluid.

NOTICE

This procedure requires two properly trained technicians.

Before checking or adjusting the pressure settings, you will need to find a properly trained technician to help. When you are able to recruit some help, create hand signals to use while working together. Nonverbal communication will be key to keeping yourself and any bystanders safe while working with the Python lift arm.

The trained technician will operate the controls form inside the cab, while you will be working on the pressure settings from the street side.

To start checking the Lift Arm Valve Pressures, you will need to put the lift arm in Manual Mode.

A. To Place the Lift Arm In Manual Mode

1. Make sure the key switch is on.
2. The system power is on.
3. Then hold the grabber open and grabber close buttons at the same time, until the alarm stops sounding.

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LIFT CONTROL VALVE PRESSURE ADJUSTMENTS (CONTINUED)

B. Checking and Making Adjustments

1. Connect a 0-5000 psi pressure gauge to the gauge port on the inlet of the valve. See the image below.

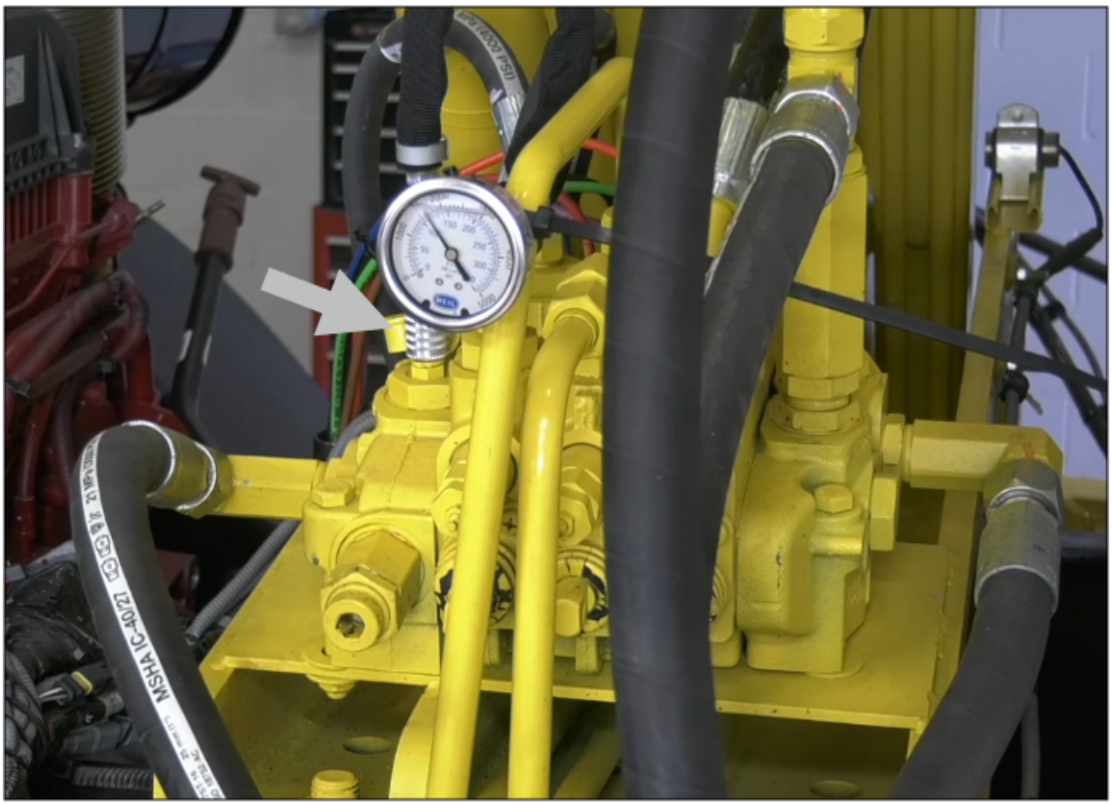


Figure 21. Inlet Section Pressure Gauge Port

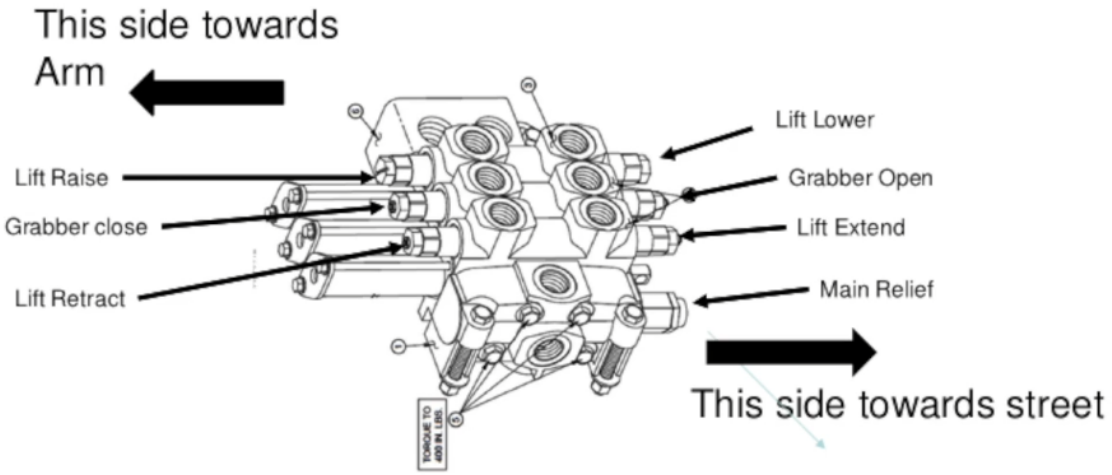


Figure 22. Seven Python Valve Pressure Settings

LIFT CONTROL VALVE RELIEF PRESSURE SETTINGS (PSI)			
LIFT MAIN RELIEF	LIFT UP (RAISE) / DOWN (LOWER)	GRABBER OPEN / CLOSE	LIFT IN (RETRACT) / OUT (EXTEND)
2300	2500 / 1250	1250 / 1250	2500 / 1250

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LIFT CONTROL VALVE PRESSURE ADJUSTMENTS (CONTINUED)

B. Checking and Making Adjustments (Continued)

2. To check the main relief on the lift valve, dead head any function that has a higher set point - like lift retract or lift raise, and hold that function while monitoring the pressure gauge. (Dead heading is when you extend or retract a cylinder to its maximum mechanical limit, and continue to maintain pressure for that circuit.)
3. To make adjustments to the main relief, you will first need to loosen the jam nut with a 1-1/2” wrench.
4. To make the adjustment you will need a 1/2” hex wrench, or a socket with ratchet.
5. To check the lift raise and lift retract port relief valves, you will need to raise the main relief one 1/2 turn clockwise so that it is high enough to allow you to see the 2500 psi.
6. Check all port reliefs by dead heading each function, one by one.
7. To make adjustments to the lift lower or lift raise port relief valves, you will need to loosen the jam nut with a 15/16” wrench. Then make the adjustment with a slotted socket bit, or a large slotted screwdriver.
8. To make pressure adjustments to the lift extend, lift retract, grabber open, or grabber close port relief valves; you will need to loosen the jam nuts with a 7/16” wrench. Then make the adjustments with a 1/8” wrench or socket with ratchet.
9. After making pressure relief adjustments, you will need to bring the main relief setting back down to 2300 PSI. To do this, view your pressure gauge while dead heading lift retract. Lower the main relief until the gauge reads 2300 PSI, and then tighten the jam nut.
10. After making pressure adjustments, make sure that all port relief valve jam nuts are tight. Then clean up your work area by removing the pressure gauge, replacing the dust cover over the gauge port, and wiping down the area.

C. To Place the Lift Arm In Automated Mode

1. Make sure the key switch is on.
2. The system power is on.
3. Then hold the grabber open and grabber close buttons at the same time, until the alarm stops sounding.

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REMOVE GRABBER BEAM ASSEMBLY

The grabber beam connects the grabber gears and grabbers to the lift arm. If the beam is damaged, you must replace the grabber beam. You need the following tools to replace the grabber beam.

A. Tools Required

Quantity	Tool
1	Personal protective equipment
1	Socket wrench (3/4” and 9/16”)
1	Impact wrench (3/4”, 15/16” and 9/16” sockets)
2	3/4” JIC plugs and caps for hydraulic fittings
1	1-1/4” wrench
1	1-1/8” wrench
1	10” C-clamp
1	1-1/2” steel rod
1	2lb hammer
	Plastic ties

B. Replace Grabber Arm

Replacing the grabber beam requires two people. To replace the beam, complete the following steps:

1. Use the 3/4” wrench and the impact wrench with the 3/4” socket to remove the bolts that connect the grabber arm to the grabber gear assembly.
2. Disconnect the grabber proximity switch cable. Use plastic ties to tie the cable out of the way.
3. Remove grabbers and set aside.
4. Use the impact wrench with the 15/16” socket to remove the retainer plate and the pin retaining bolt. See the figure below. DO NOT remove the pin yet. You will remove the pin in a later step.

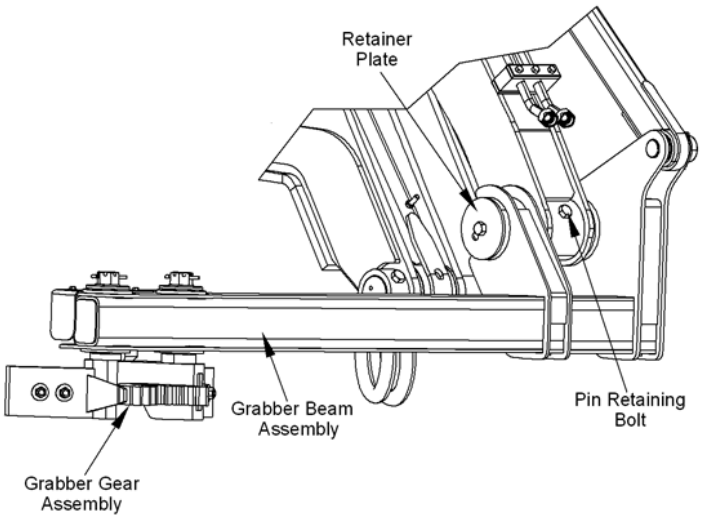


Figure 23. Grabber Beam and Gear Assemblies with Retainer Plate and Pin Retaining Bolt

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REMOVE GRABBER BEAM ASSEMBLY (CONTINUED)

5. To make the pin easier to remove, insert a different bolt with a washer into the bolt hole. Inserting this bolt makes it easier to remove the pin. DO NOT use the original bolt.
6. Use the 9/16” wrench and the impact wrench with the 9/16” socket to remove the level pin retaining bolt. See the figure below. DO NOT remove the pin.

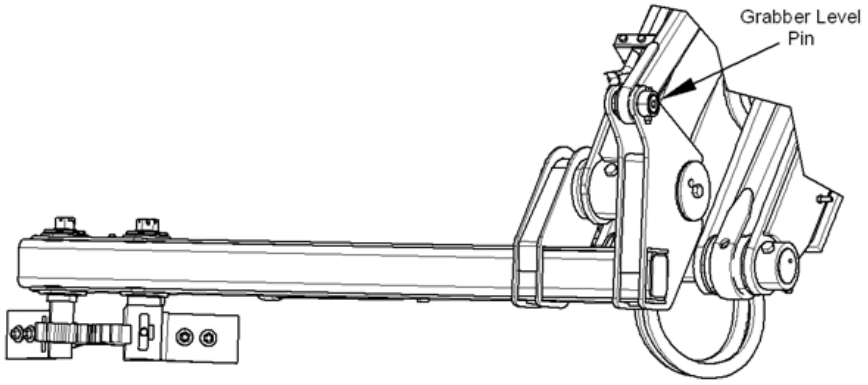


Figure 24. Grabber Level Pin Location

7. Use the 1-1/4” and 1-1/8” wrenches to disconnect the two grabber cylinder hydraulic hoses.
8. Use the 3/4” plugs and caps to cap off the hydraulic fittings and hoses.
9. Use the plastic ties to tie the hydraulic hoses out of the way.
10. Support the grabber arm assembly and use the C-clamp to secure the arm assembly to the support. In the Figure below, the arm assembly is supported by a fork lift.



Figure 25. Secured Grabber Arm

11. Remove the grabber level pin.
12. Use the 1-1/2” steel rod and the 2 lb hammer to remove the grabber pin. Make sure the spacers in the bore do not fall out when you remove the grabber pin. Use plastic ties to hold the spacers in place. Make sure you lay aside the retainer plate from the opposite side when you remove the pin.
13. Slowly lower the grabber beam assembly.

NOTICE

Before re-installing pins, be sure to coat all pins with anti-seize compound.

14. To replace the arm, perform these steps in reverse.

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RELIEF VALVE ADJUSTMENT

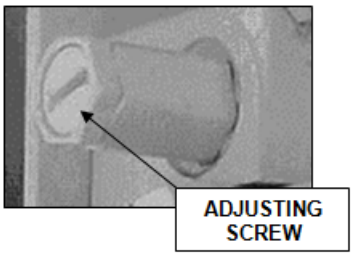
Follow these steps to set the main relief valve.

A. Tools Required

Quantity	Tool
1	Personal protective equipment
1	Pressure gauge (0-5000)
1	1-1/2" Wrench
1	15/16" Wrench
1	7/16" Wrench
1	1/8" Wrench
1	1/2" Hex Wrench
1	Wire cutters
1	Slotted Screwdriver
1	Replacement seal

B. Before Making Adjustments

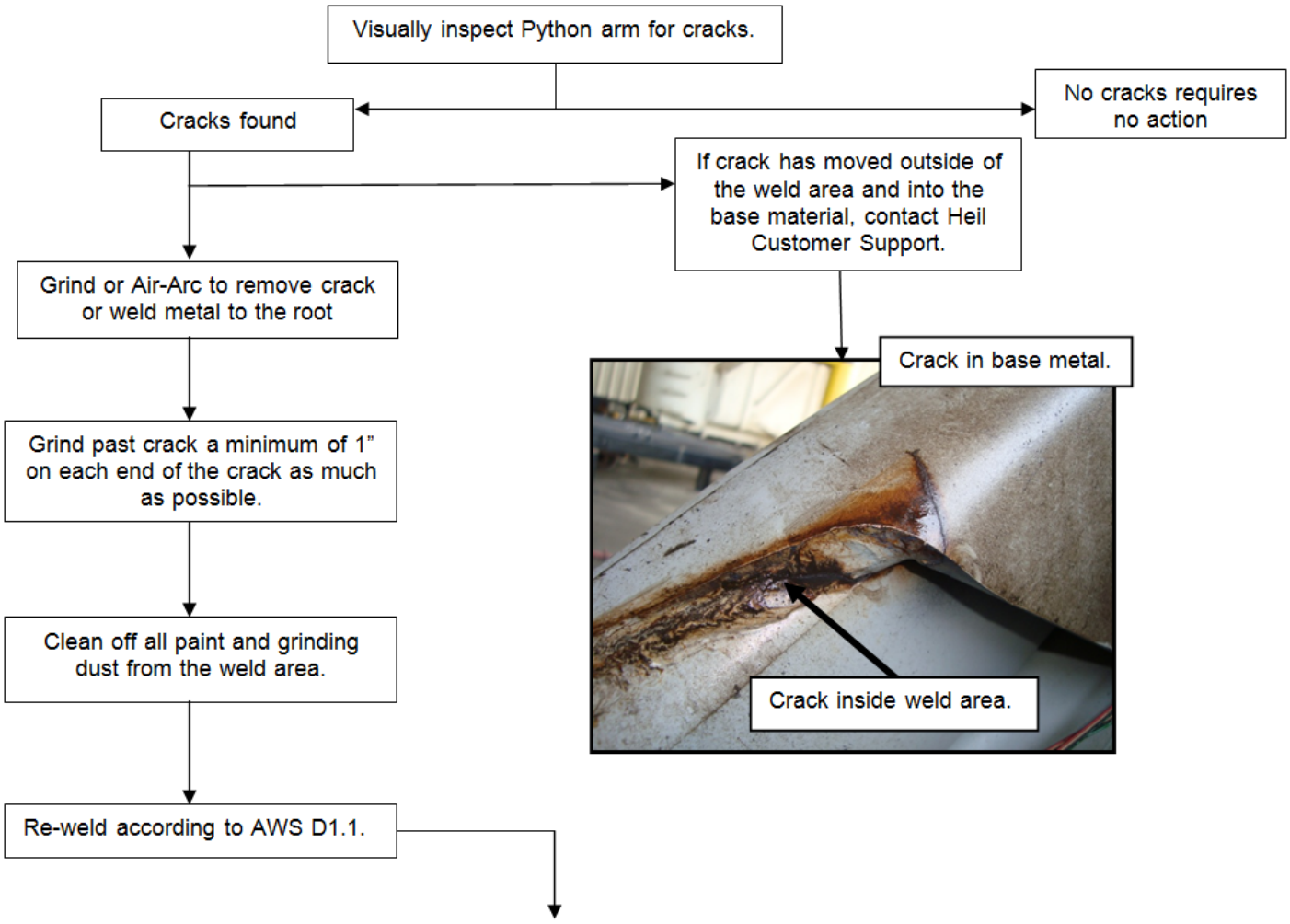
1. MAKE SURE the unit is on flat, stable ground and apply the parking brake and chock the wheels.
2. MAKE SURE the area around the unit is clear of all unnecessary people before you operate the controls.
3. Connect an approved pressure gauge to the unit's hydraulic circuit where it will read the relief pressure.
4. Make sure the hydraulic oil tank is full.
5. Start the unit.
6. Activate and hold the hydraulic function that activates the hydraulic relief circuit to heat the oil.
   a. Units with Shur-Lock systems must use the tailgate lock function.
   b. Rear loaders must use the ejector retract function.
7. Every two minutes, cycle the ejector cylinder function to mix the hot oil.
8. Continue steps 6 and 7 until the oil temperature thermometer on the oil tank reads a minimum 140 ° to a maximum 160°.
9. Adjust the relief pressure.
   a. Loosen the main relief valve jam nut using the 1-1/8" open end wrench.
   b. Rotate and hold tailgate lower switch (on outside control box).
   c. Read the pressure gauge, it should be 2500 +/- 100 PSI.
   d. Turn the adjusting screw OUT (counter clockwise) to decrease the pressure or turn the screw IN (clockwise) to increase the pressure.
   e. Tighten the jam nut when the pressure is 2500 +/- 100 PSI.



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LIFT AND WELD CRACKS DECISION TREE

Use this decision tree to help you decide whether to repair a crack or to replace the entire lift arm.



Weld Procedure			
.045 ER70S-X	**.35 ER70S-X**	**5/13 ER6010**	**1/8 ER7018**
Volts: 37 - 32	**Volts:** 26 – 30	**Amps:** 170	**Amps:** 130
WFS: 450 – 525 IPM	**WFS:** 500 – 575 IPM	**Polarity**: DC+	**Polarity:** DC+

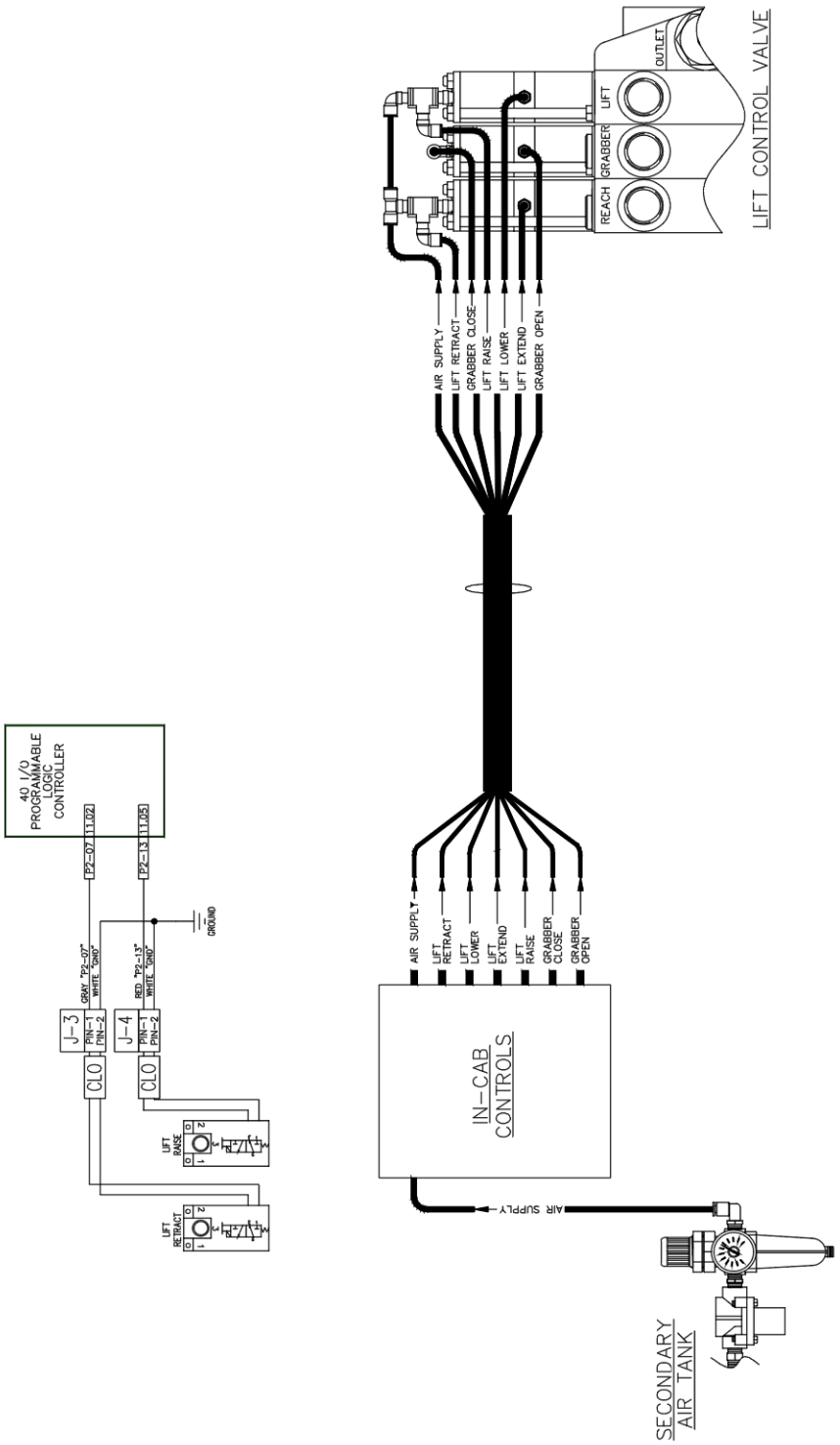
Follow these welding requirements for repairing the lift arm.

1. All material shall be free from paint, soil, grease, dirt, and any other non-metal contamination.
2. Weld according to the Weld Procedure.
3. All welds shall be in conformance of AWS D1.1.
4. Inspection supervisor required.
5. Attach the ground lead as close as practical to the section where you are working. Disconnect the battery negative or ground cable from the battery.

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LIFT CONTROL PNEUMATIC INSTALLATION WITH AUTOLIFT FUNCTION

Use the following illustration to troubleshoot the Autolift function.



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SECTION 4
BODY AND TAILGATE

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NOMENCLATURE

The following picture shows the major components and their typical location on the unit.

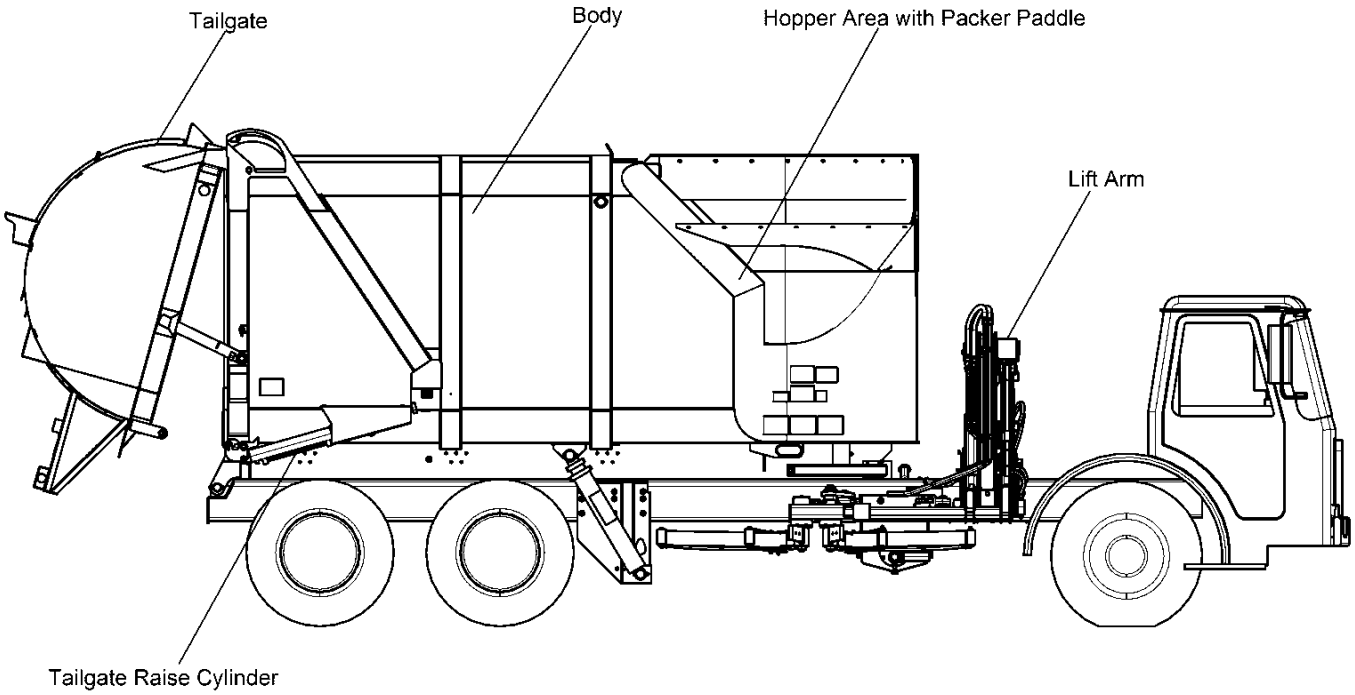


Figure 26. Body Nomenclature

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SPECIFICATIONS

NOTICE

All pressures are +/- 100 PSI at operating temperature. See **Lift Control Valve Pressure Adjustments** 55 and **Relief Valve Adjustment** 60 pages for valve adjustment procedures.

Valve Pressure Settings:

Loader Main Systems	2300 PSI
Loader In/Out Cross-Port Relief	2500/1250 PSI
Body Main Relief Valve	2400 PSI
Packer Pressure Switch	2200 PSI

Cycle Times:

Packer Cycle (Empty Hopper - @ 16 GPM- 180° Sweep	13-16 Seconds

NOTICE

Check the lift mount bolts every 40 hours (weekly) for tightness.

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BODY PROPS

The factory-supplied body props are located on both sides under the body and forward of the rear wheels. Refer the figure below. Follow these steps to lower the body props.

BODY PROP OPERATION

⚠WARNING

Body must be unloaded before using props. DO NOT MOVE truck while the body is resting on the body props. Two props are installed on the vehicle.
BOTH props must be used!

TO USE PROPS:
1. Raise body to a height where props can be swung into position.
2. Remove transit position body prop retainers and swing body props to support position.
3. Lower body until body props support the weight and visually inspect to see that props are located on the saddles and secure.
4. Place unit in Lock-Out/Tag-Out mode before performing any work.

NOTE: Hoist is single acting (lowered by gravity only).

⚠ DANGER

Do not enter under the body area unless the unit is in Lock-Out/Tag-Out mode. To place unit in Lock-Out/Tag-Out mode, stop the engine, set the brakes and make sure the brakes are holding and working properly, chock all wheels, remove the keys from the cab, place keys in a secure location, and insert a Lock-Out Tag on the steering wheel.

TO STORE PROPS:
1. Raise body slightly.
2. Return props to transit position and install retainers.

212-1329

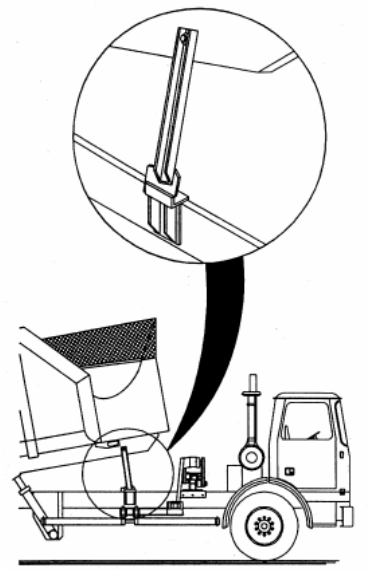


Figure 27. Factory Body Props

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TAILGATE SUPPORT PROPS

TAILGATE PROP OPERATION

IMPORTANT: TAILGATE MUST BE FREE OF REFUSE AND ALL PERSONS CLEAR OF TAILGATE BEFORE PERFORMING THE FOLLOWING STEPS.

⚠ CAUTION

TWO PROPS ARE INSTALLED ON THE UNIT. BOTH MUST BE USED!

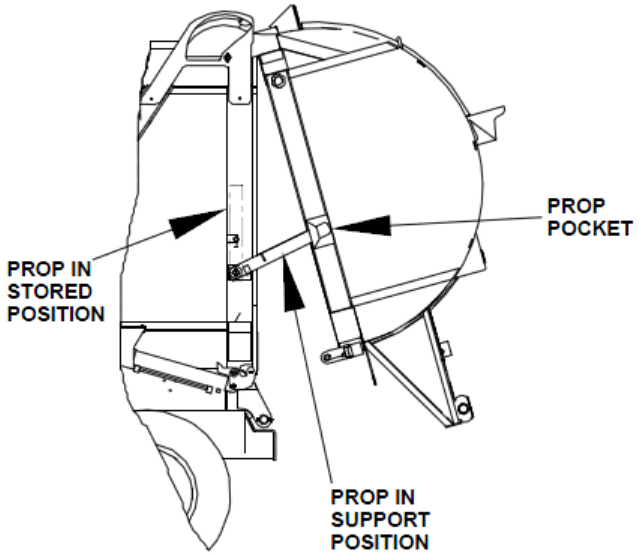
Whenever the tailgate is opened for service or maintenance, these props must be used.

TO USE PROPS:

1. Set unit on level surface and apply parking brake.
2. Remove pins holding prop in stored bracket.
3. Raise tailgate to height where props can be rotated to fit into prop pocket on each side of unit.
4. Rotate props.
5. Slowly lower tailgate until props are fully inserted into prop pockets.
6. Turn engine off and remove ignition key. Add Lockout/Tagout decal to steering wheel.

TO STORE PROPS:

1. Raise tailgate slightly and rotate prop to stored position and install pin.
2. Lower tailgate completely until down and latched
3. Remove Lockout/Tagout decal from steering wheel.



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PRESSURE ADJUSTMENT PROCEDURES

⚠ CAUTION

Prior to making any adjustments to the packer circuit, the body must be properly blocked with body props and in the elevated position.

⚠ CAUTION

Prior to making any adjustments to the body main relief valve, block wheels of the unit and set the parking brake.

NOTICE

Hydraulic pressure above 2400 PSI will cause excessive pin wear and reduced linkage life.

The following pages detail the procedures for adjusting the packer circuits. These adjustments require two (2) persons, one of which must be a fully trained and authorized operator.

The unit uses a tandem pump for the system operation. The large section of the pump (30 GPM @1500 engine RPM) operates the packer, body raise and tailgate circuits. The small section of the pump (16 GPM @ 1500 engine RPM or 725 engine RPM for OIGAI systems) operates the loader functions.

Packer Pressure Switch is located on the hydraulic tank and is plumbed into the side of the packer valve. This switch is adjustable and is set at 2000 +/ -50 PSI. To adjust the packer pressure switch setting follow these steps:

1. With the engine off, install an accurate 0-5000 PSI gauge in the quick disconnect port.
2. Lower the body main relief valve 2200 PSI +/ -50. See “Body Main Relief Adjustment” for proper procedure.
3. Lower the packer pressure switch setting to 2200 PSI by turning the adjustment switch twice.
4. With the engine running, se the Auto/Manual Packer rocker switch (on the control panel in the cab) to the manual position. Depress the Left/Right rocker switch on the control panel to collapse a packer cylinder. The in cab buzzer should sound when a packer cylinder is bottomed out.
5. Reset the body main relief valve to 2400 PSI.

Body Main Relief Valve is located on the packer valve. This relief can be adjusted slightly, and can be set as follows:

1. Set the Packer Auto/manual rocker switch to the manual position and depress the Left or Right Packer rocker switch to fully collapse one of the packer cylinders.
2. Read the pressure gauge at 1500 engine RPM.
3. Remove the cap or castle nut from the relief cartridge adjusting screw.
4. Loosen the adjusting screw jam nut on the relief cartridge adjusting screw and turn the adjusting screw clockwise to increase the pressure until the gauge reads 2400 PSI.
5. Tighten the locking nut and replace the plastic cap.

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RELIEF VALVE ADJUSTMENT

This page contains the steps to making an adjustment to the relief valve.

A. Tools Required

1. 1-1/8” open end wrench
2. Ratchet with screwdriver attachment
3. 0-3000 PSI glycerin filled pressure gauge

B. Before Making Adjustments

1. MAKE SURE the unit is on flat, stable ground and apply the parking brake and chock the wheels.
2. MAKE SURE the area around the unit is clear of all unnecessary people before you operate the controls.
3. Connect an approved pressure gauge to the unit’s hydraulic circuit where it will read the relief pressure.
4. Make sure the hydraulic oil tank is full.
5. Start the unit.
6. Activate and hold the hydraulic function that activates the hydraulic relief circuit to heat the oil.
   - Units with Shur-Lock systems must use the tailgate lock function.
   - Rear loaders must use the ejector retract function.
7. Every two minutes, cycle the ejector cylinder function to mix the hot oil.
8. Continue steps 6 and 7 until the oil temperature thermometer on the oil tank reads a minimum 140° to a maximum 160°.
9. Adjust the relief pressure.
   - Loosen the main relief valve jam nut using the 1-1/8” open end wrench.
   - Rotate and hold tailgate lower switch (on outside control box).
   - Read the pressure gauge, it should be 2300 +/- 100 PSI.
   - Turn the adjusting screw OUT (counterclockwise) to decrease the pressure or turn the screw IN (clockwise) to increase the pressure.
   - Tighten the jam nut when the pressure is 2300 +/- 100 PSI.

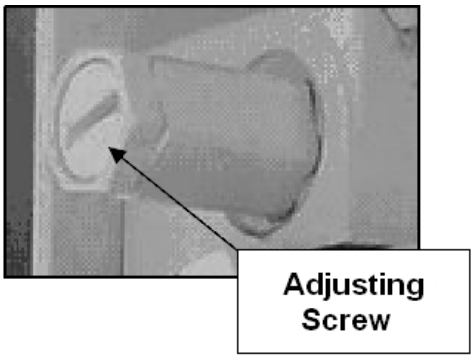


Figure 28. Pressure Relief Valve Adjustment Location

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LIFT CONTROL VALVE FOR LIBERTY WITH TANDEM PUMP SETUP

This hydraulic system is used with a tandem pump set up. The system is activated by energizing pump solenoid “A”. This solenoid is normally open and blocks (closes) the unloader system pressure when it is energized. Pump solenoid “B” is mounted directly on the hydraulic pump. See pump photo page.

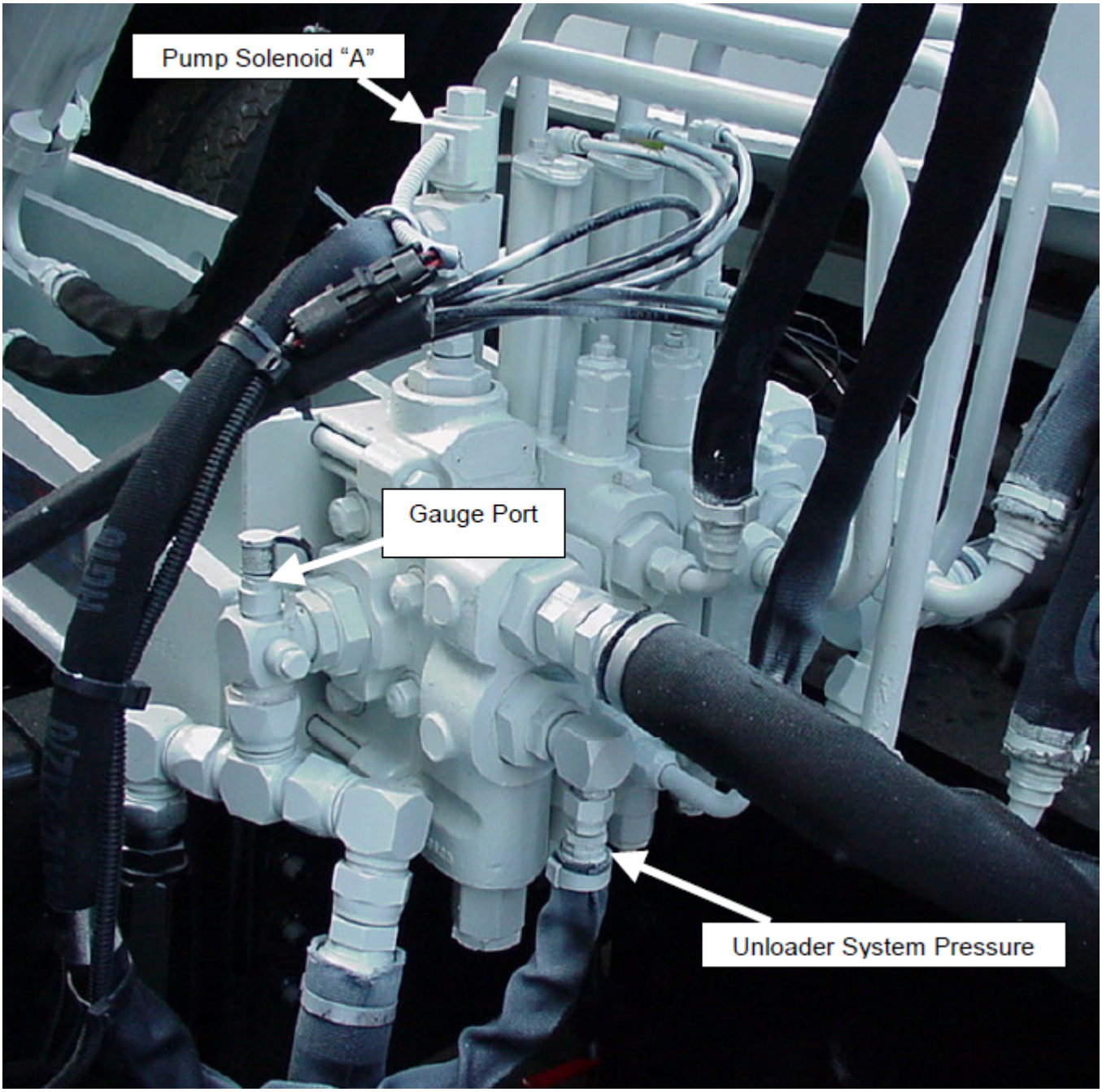
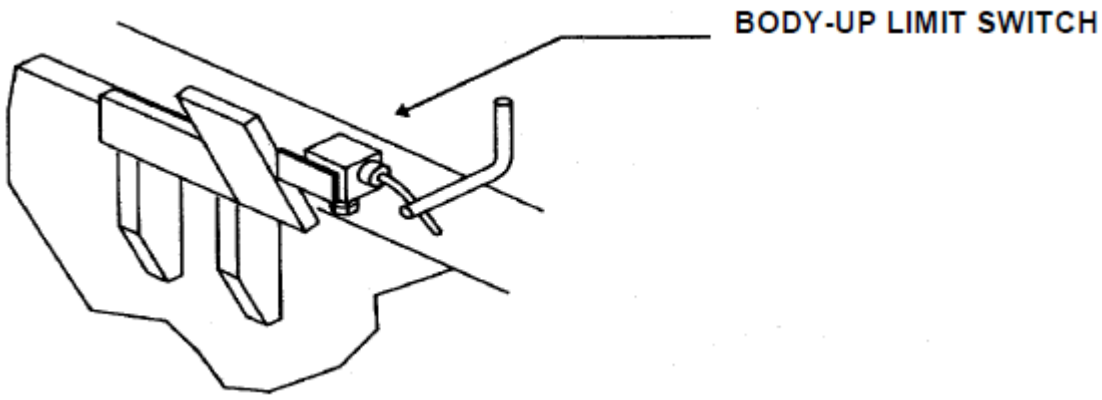


Figure 29. Lift Control Valve for Liberty with Tandem Pump

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BODY-UP LIMIT SWITCH

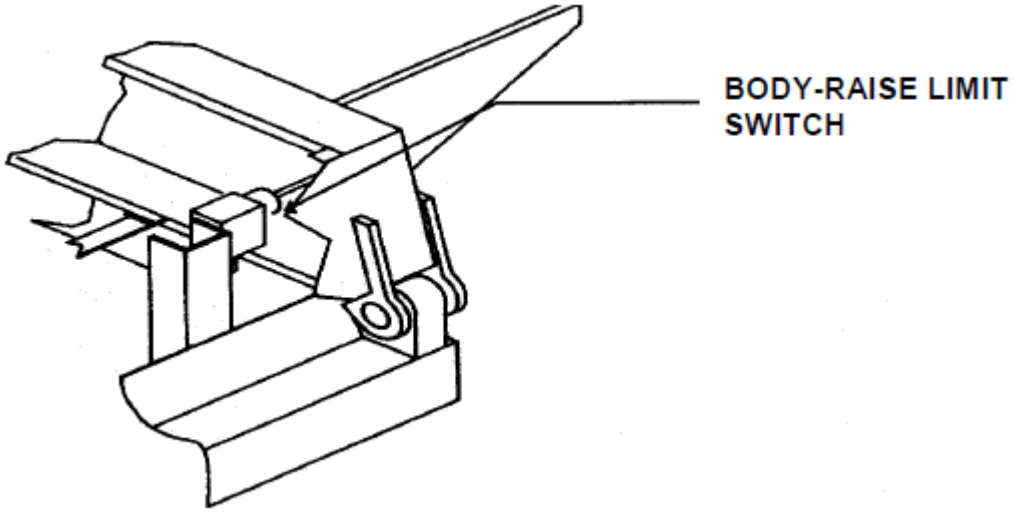
The Body-Up Limit Switch is a non-adjustable normally closed (N.C.) switch and is located on the left body prop bracket with the striker located on the body above the switch. This limit switch turns on an alarm when the body is raised off the chassis.



⚠ CAUTION

If the Body-Up Limit Switch does not activate the alarm, DO NOT the truck. Further troubleshooting is required.

The Body-Up Limit Switch is a non-adjustable normally closed (N. C.) switch and is mounted on a bracket off the right rear hinge plate. It is activated by making contact with the lower flange of the body long member. This switch limits how high the body will raise by interrupting the power to the UP solenoid on the body/packer valve. This switch should be activated before either body hoist cylinder bottoms out or before the body exceeds a 40 degree dump angle.



Although the Body-Up Limit Switch is non-adjustable, it is mounted on a slotted bracket enabling the switch to slide up or down if some adjustment is required. If the switch is not activated when the body is raised, adjust the switch by loosening the bolts holding the switch to the bracket and slide the switch down on the bracket.

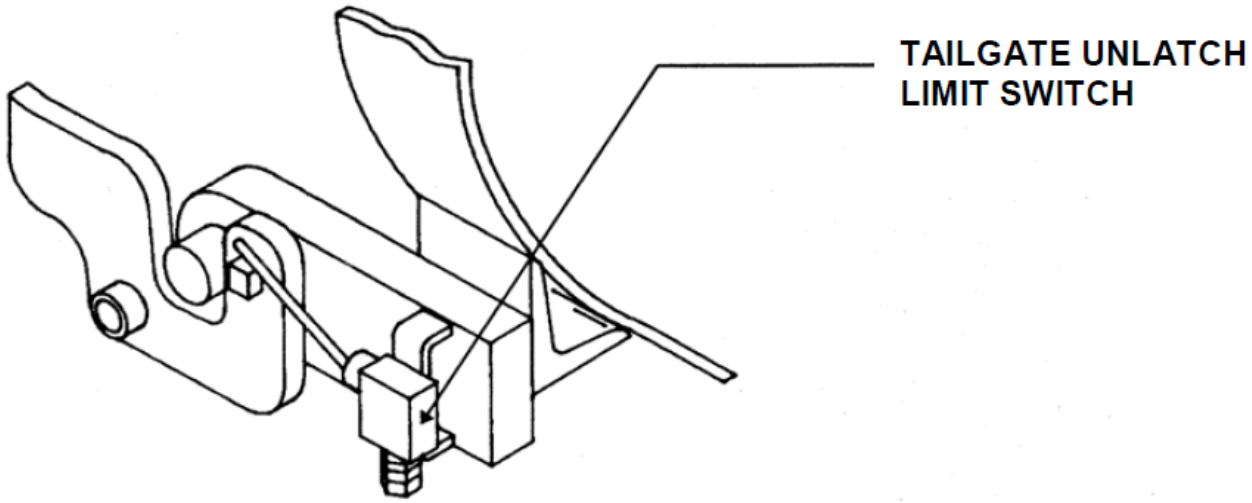
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TAILGATE UNLATCH LIMIT SWITCH (N.C.)

The Tailgate Unlatch Limit Switch (N.C.) is non-adjustable and mounted on the tailgate with the striker mounted on the tailgate hinge. It is activated by breaking contact with the striker. When the tailgate latch is released, causing the striker to move, this switch interrupts an electrical circuit causing an alarm to sound, warning the operator that the tailgate is not fully closed and latched.

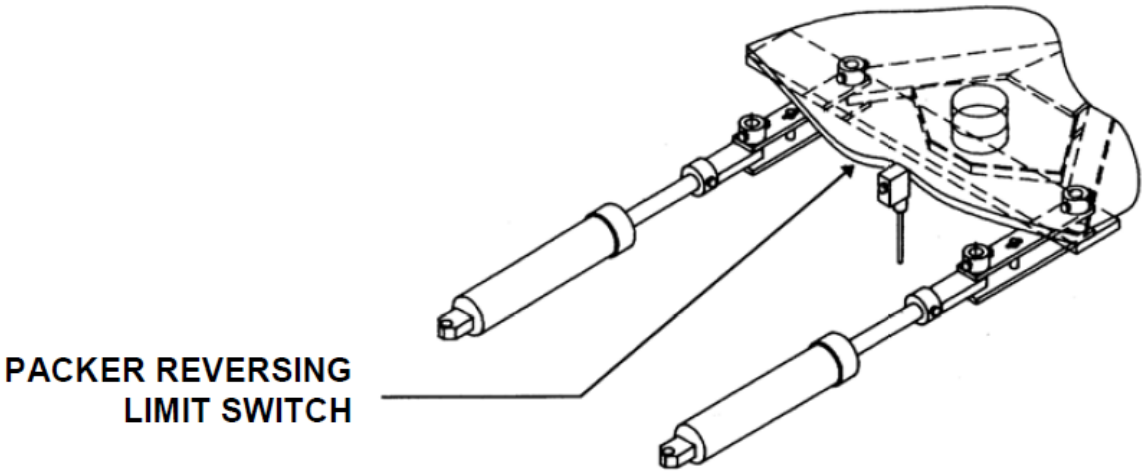
⚠ CAUTION

If the tailgate unlatch limit switch does not activate the alarm, DO NOT operate the truck. Further troubleshooting is required.



PACKER REVERSING LIMIT SWITCH (N.C.)

The Packer Reversing Limit Switch (N.C.) is non-adjustable located under the body behind the packer actuator plate. This switch is used to signal when to reverse the direction of the packer paddle in the automatic packing condition. It should be mounted so that the reversing motion of the packer paddle occurs before the left or right hand packer cylinder completely bottoms out. If this switch does not work, the body full alarm will sound.



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WELDING AND ELECTRONIC DEVICES / ELECTRICAL LUBRICANTS

Before welding on any unit with electronic devices like the Cortex Controller™, electronic control units (ECUs), and proximity switches complete the following procedures.

⚠ WARNING

Never weld on a compressed natural gas vehicle unless the compressed natural gas fuel system has been purged with inert gas. See Service Manual Section 1.

- Disconnect all battery connections.
- Place welding ground as close as possible to the area that is being repaired.
- Disconnect the Cortex Controller and all other electronic control units (ECUs).
- If welding within 24 inches of a proximity switch, remove the switch from the unit.

NOTICE

Failure to follow these procedures may cause damage to the devices. The damage comes from the inability of the devices to withstand the amperage, open circuit voltage and magnetic flux a welder can produce.

Electrical Anti-Corrosion Lubricant

It is very important that all Packard connectors are properly lubricated. The following compounds, by brand name, or functional equivalents, are approved for use.

- Truck-Lite Corrosion Preventive Compound
- GB ox-gard, anti-oxidant compound
- Burndy Penetrox A electrical joint compound.

These lubricants may be obtained at an electrical supply store.

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SECTION 5
MAINTENANCE AND ADJUSTMENT

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BODY DAILY CHECKLIST

Make sure you perform a daily check of the unit. Refer to the Operator's Manual for the Daily Checklist. Many checks in the Daily Checklist are maintenance related, such as checking tire pressures and hoses for wear and damage.

DAILY CHECKLIST MAINTENANCE ITEMS	
Item	Required Action
Low air pressure in tires	Inflate the tire to the correct air pressure given on the tire.
Worn tire	Replace when the wear is greater than allowed by law or before the tread is no longer visible.
Damaged tire	Replace immediately BEFORE going on route.
Hydraulic pump leaks	Determine the cause of the leak and repair immediately.
Damaged hydraulic pump	Repair or replace IMMEDIATELY.
Loose or missing hardware for the hydraulic pump	Tighten loose hardware. Replace missing hardware immediately.
Damaged decal or decal not readable	Replace decal immediately.
Low level of hydraulic oil	Fill the hydraulic oil tank immediately.
Worn or damaged hoses	Replace immediately.
Leaks at cylinders, hoses or fittings	Tighten loose connection.
Loose or missing hardware	Tighten loose connections. Replace missing hardware.
Worn fiber guards	Replace hoses/fittings as necessary. Install new fiber guard on new hoses.
Worn or damaged tailgate lock components	Replace worn or damaged components.
Loose or missing tailgate lock hardware	Tighten loose hardware. Replace missing hardware.
Damaged tailgate seal	Replace seal.
Body structure has loose or missing hardware	Tighten loose hardware. Replace missing hardware.
Body structure has cracked weld joints	Repair immediately.
Body mounting brackets have loose hardware, damaged hardware or cracked welds	Tighten loose hardware. Replace missing hardware. Repair cracked welds.
Air regulator	90 PSI, typically located at front of body.
Operation	Operate All Functions to make sure all functions work correctly.

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BODY PREVENTIVE MAINTENANCE CHART

Preventive maintenance must be performed to ensure the safe and reliable operation of your unit. Use the chart below as a guideline for when essential items should checked and serviced. Severe use or adverse conditions may require more frequent maintenance.

BODY PREVENTIVE MAINTENANCE CHART						
	*HOURS OF OPERATION					
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
Hydraulic System	☑					Check oil level – add if necessary
		☑				Check cylinders, pump, hoses, tubes, fittings, and adapters for leaks. Check hoses for cracks, crushes, and cover blisters. Repair or replace if necessary with genuine Heil parts. Any replacement hose should be the same size and pressure rating as listed on the original OEM hose.
		☑				Check Control valve seals for leaks. Repair or replace if necessary.
				☑		Replace filter after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON.
				☑		Replace tank breather filter every time you replace filter element.
					☑	Drain, flush, and refill. Change filter element.
Electrical, Battery Cables	☑					Check for proper operation.
		☑				Check battery cables from battery to starter for loose cables, rubbing or damage and abrasions to cables. Replace if necessary.
Operator Controls	☑					
Front Mount Pump or Power Take-Off (PTO)		☑				Check seals for leaks and operation. Replace if necessary
		☑				Check drive line for smooth operation. Replace as necessary.
		☑				Check set screws for tightness. Tighten as necessary.
		☑				Make sure keys are in place. Replace if necessary.
			☑			For greaseable PTOs (non-wet spline), remove the pump's bolt flange about 2 inches from the PTO and apply grease to female pilot of PTO pump flange. Failure to lubricate female pilot of PTO as given may cause damage to the pump shaft. Greasing is NOT required on wet spline PTOs such as the Chelsea 890/897 series.

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BODY PREVENTIVE MAINTENANCE CHART						
*HOURS OF OPERATION						
COMPONENT/SYSTEM	**8**	**40**	**200**	**1000**	**2000**	**CHECK/SERVICE**
Grease Fittings		☑				Lubricate as shown on Body Lube Chart.
Body Undercoating					☑	Inspect body undercoating and repair as necessary.
Tailgate Seal Integrity	☑					
* Daily = 8 hrs. Weekly = 40 hrs. Monthly = 200 hrs. 6 Months = 1000 hrs. Yearly = 2000 hrs.						

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BODY LUBRICATION GUIDE

Clean fittings before applying grease and always pump enough grease into joint to remove the old grease. Wipe off excess grease. Lubricate moveable mechanical parts without fittings every 60 days with non-detergent engine oil.

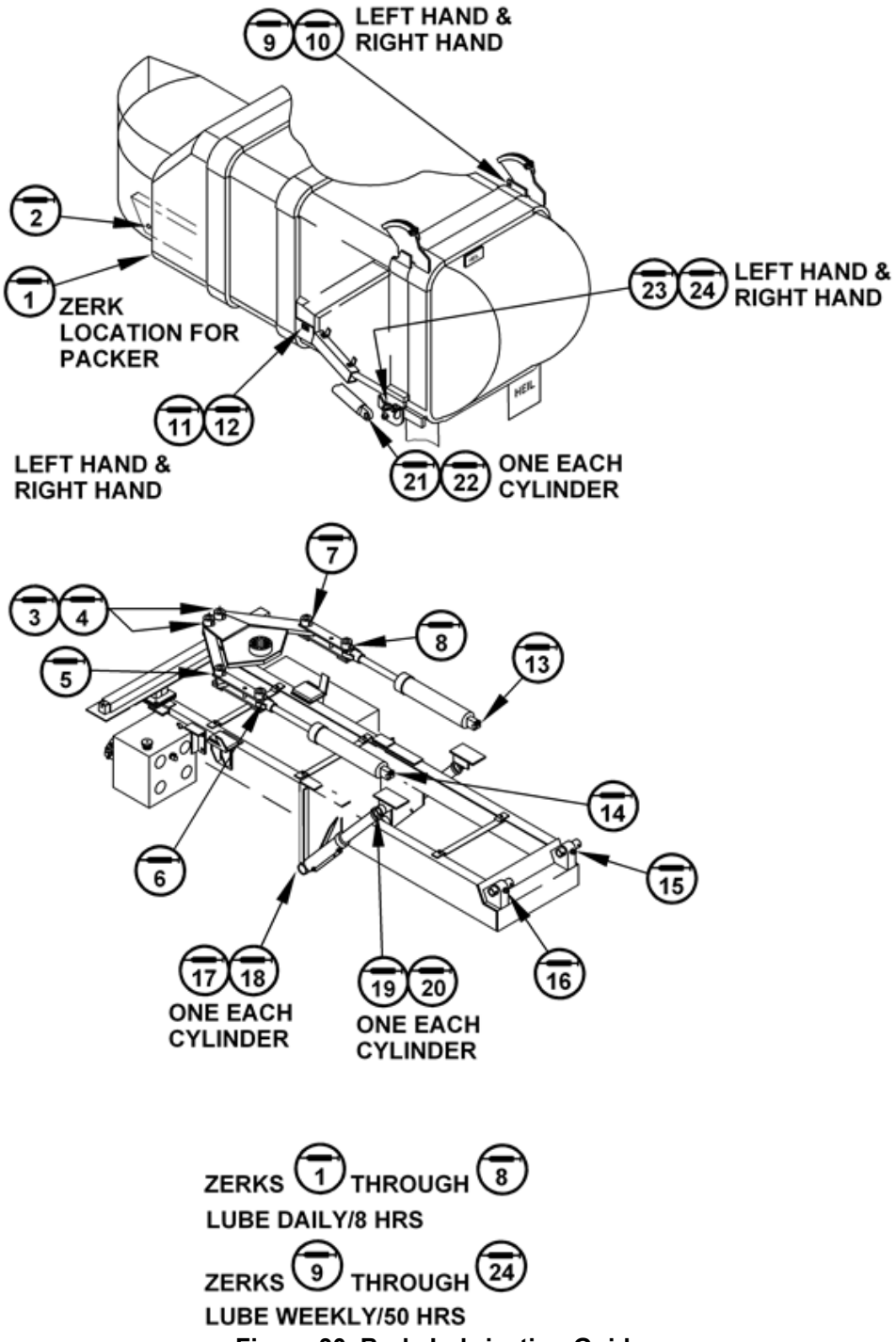


Figure 30. Body Lubrication Guide

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10 POINT AUTO LUBE

⚠ CAUTION

If one of the hydraulic hoses breaks, all the grease in the reservoir will drain. If one of the nylon lines break, only grease stored in the individual injector will drain.

A. Operation

THE Heil Rapid Rail 10-Point Automatic Lube System is used to lubricate the packer mechanism. It is designed to apply grease to each of the bearings for the packer each time the tailgate is raised. Hydraulic pressure of the tailgate raise circuit is utilized to pressurize a 3” diameter cylinder under the front of the packer. The cylinder has welded end caps and contains piston inside.

A small amount of oil pressurizes the cylinder each time the tailgate is raised and forces grease out the opposite end. Grease leaving the cylinder flows through two hydraulic hoses connected to manifolds of injectors – six mounted on the packer actuator plate to lubricate the linkage and two behind the left frame rail to lubricate the bearings at each end of the packer shaft. Each injector takes approximately 800 PSI to open and stores about 0.15cc of grease for each pin. The grease moves in each lube point through small nylon lines and a fitting to the pin surface.

It is important to inspect the system frequently. Without lubrication the pins and bearings will wear very quickly, such that both pins and bearings will require replacement. The lubrication lines must be visually inspected daily to ensure they are connected to every packer pin, and that every pin is being lubricated. Make sure the chassis engine is stopped before adjusting or repairing any part of the lubrication or packer mechanism system. Broken hoses and fittings should be replaced and the lubrication cylinder/reservoir filled as needed, every two or three weeks with normal use.

B. Packer System Grease

⚠ CAUTION

DO NOT attempt to use any other grease; to do so will cause the lube line to fail.

Double 00 and Triple 000 greases for Auto Lube Systems:

- EP CONOLITH 000, CONOCO
- LIDOK 000, EXXON
- MOBILUX EP 023, MOBIL
- OSSAGOL V 000, SHELL
- UNOCAL MM GREASE LITHIUM 000, 76 UNOCAL
- BIODEGRADABLE GREASE – SL WR AA1 000, SENTINEL

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10 POINT AUTO LUBE (CONTINUED)

C. Maintenance

(a) How to Refill Lubrication Cylinder

- Raise the body and secure with body props.
- Tailgate must be closed and locked in position.
- Rotate the packer so that the lubrication cylinder is in a convenient access position, such as front street side.
- Turn ignition off
- To fill the reservoir, locate the grease fittings on the inside end and the ¼” grease line coming from the inside end of the cylinder.
- As you add grease, you must allow hydraulic oil to flow out the opposite end. This can be done in a number of ways:
    1) With the packer in MANUAL mode to operate the tailgate, engine off but ignition switch on, hold down the tailgate “down” control. While the valve is trying to lower the tailgate, the oil can flow out of the cylinder, through the valve and into the tank
    2) With the engine off, but ignition switch on and the PTO engaged, place a jumper wire from tailgate “down” to the TO in the lower junction box
    3) Hook up a temporary hose to the oil end of the lube cylinder and let it drain into the tank.

(b) Using a grease gun filled with NLGI 000 grease; fill the cylinder/reservoir from the grease zerk on the opposite end. This grease is light and thin so that it can pass through lubrication lines.

(c) Disconnect the jumper line or reconnect the hydraulic hoses.

(d) Operate the tailgate open/close mechanism several times to check for leaks and broken hoses.

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PREPARING THE UNIT TO CHECK THE OIL LEVEL

Before checking the oil level or adding oil, make sure the unit is in the following position with all cylinders collapsed:

- Truck – on level ground
- Tailgate and Body – fully down and locked
- Packer Panel – in the in-transit position with all cylinders retracted
- Lift Arm (if equipped) – is fully retracted

The oil tank is mounted behind the chassis cab. The oil level in the standard tank must be kept between the low and full marks as indicated on the sight gauge. See the figure below.

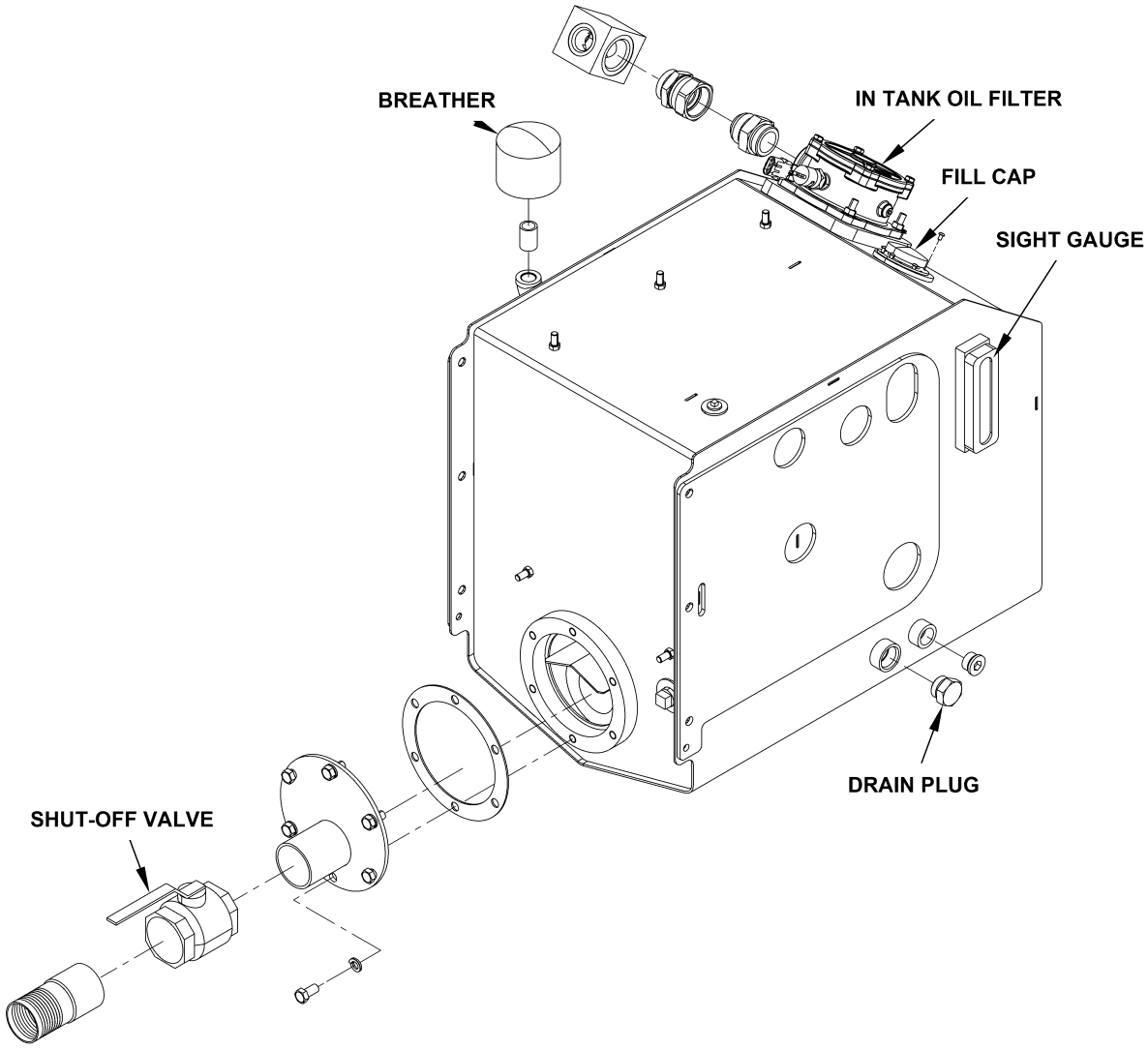


Figure 31. Hydraulic Oil Tank and Sight Gauge

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CHECK OIL LEVEL

Check the hydraulic oil level (after warning up the oil) daily or every eight (8) hours, whichever comes first. Fill as necessary.

Important: Contamination is a hydraulic system's worst enemy. Do not let dirt enter the system. Use a clean rag and remove dirt or other contamination around any system component before you disconnect or remove it. While you fill the reservoir, filter the oil through a 200 mesh (or finer) screen. Never use a cloth to filter the oil.

WHEN TO CHANGE OIL FILTER ELEMENT

Change the filter more often under certain conditions such as an extremely dusty atmosphere or area. Use only Heil replacement filters. Purchase the filter element from your local Heil distributor.

Change the filter element when oil analysis shows the oil has expired.

CHANGE HYDRAULIC OIL FILTER ELEMENT

Watch the Service Shack Video online at **www.Heil.com/Heil-Service-Shack** and selecting **Changing Filters**.

Replace the hydraulic filter element after first 30 days of operation, then every 6 months or 1000 hours of operation OR when filter bypass light is ON. To change the hydraulic oil filter, refer to the figure below and follow these steps:

1. Using a 1/2" wrench, remove the four (4) nuts from the filter cover located on the hydraulic oil tank.
2. Set the nuts aside for reuse and then remove the filter cover.
3. Remove the filter element with the by-pass assembly and responsibly discard as required.
4. Clean the housing with a clean, lint-free cloth.
5. Check the o-ring and gasket. Replace them if necessary.
6. Lubricate all o-rings and gaskets.
7. Install new element.
8. Reinstall cover with nuts. Torque nuts to 13 ft-lbs.

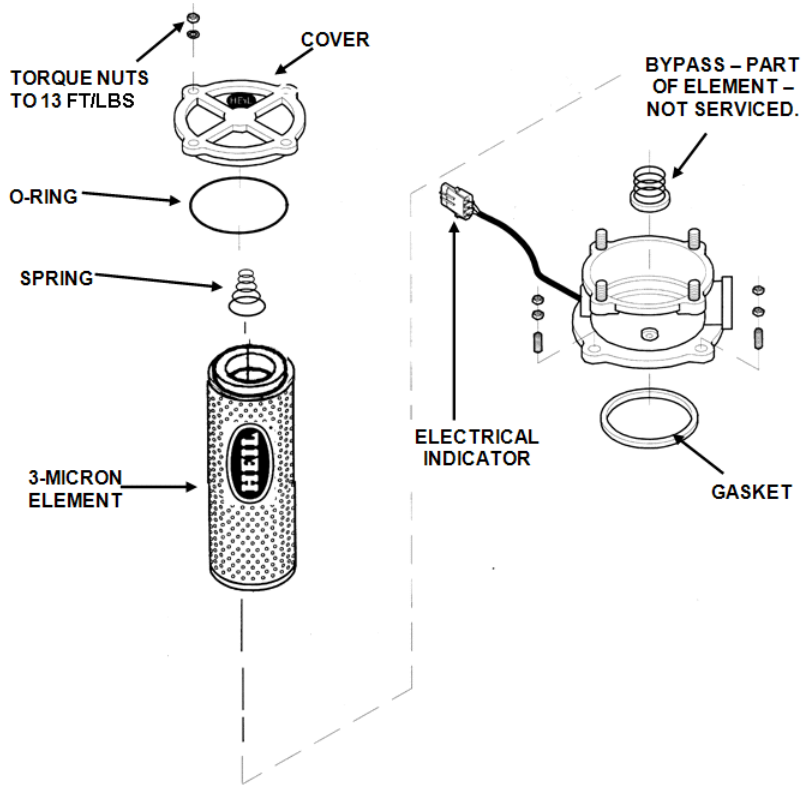


Figure 32. Hydraulic Oil Filter

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DRAIN AND CLEAN THE HYDRAULIC OIL TANK

Change the hydraulic oil when the oil sample shows to change it.

Remember that almost all hydraulic system malfunctions can be traced to dirt in the fluid. When working with the hydraulic system, the hands, tools, working area and parts must be as clean as possible.

⚠ CAUTION

Wear proper eye protection when you are working on or around hydraulic lines or components. Wear proper eye protection and avoid contact with hydraulic oil if possible. Never check for oil leaks with your hands.

To drain and clean the hydraulic oil tank, follow these steps:

1. Disengage the pump, shut off the engine and remove the ignition key.

⚠ WARNING

Make sure the unit is in the Lock-Out/Tag-Out mode when you do maintenance or service procedures, or when you go in the hopper, climb in or on the body or on equipment. Equipment can be operated when the unit is not in the Lock-Out/Tag-Out mode. When the unit is not in the Lock-Out/Tag-Out mode, equipment operated while you do maintenance or service procedures, go in the hopper or climb in or on the body or on equipment can cause serious injury or death.

NOTICE

If your employer or company has Lock-Out/Tag-Out procedures that are different from the following procedures, use your employer's or company's procedures. If your employer or company does not have Lock-Out/Tag-Out procedures, use the procedures that follow.

2. Contact your supervisor if you have any questions about Lock-Out/Tag-Out procedures. If your supervisor has any questions, that person can contact ESG Technical Service. Perform the **Lock Out/Tag Out procedures** 15.
3. Remove the fill cap from the top of the tank.
4. Remove the drain plug from the bottom of the tank so that the oil drains into a container.
5. While fluid is draining from the tank, remove and replace the filter/breather assembly. Change the assembly every time the in-tank filter is replaced.
6. To drain the entire hydraulic system, disconnect all hoses at the adapter and drain the hoses into a container.
7. Remove and replace the in-tank filter as described in **Change the Hydraulic Oil Filter**.
8. Remove the outlet flange and 100 mesh suction strainer to gain access to the tank inside.
9. Remove sediment from the tank bottom.
10. Install the outlet flange with a new gasket and the 100 mesh suction strainer into the tank.
11. Install the drain plug in the tank bottom.
12. Reconnect and tighten all hose connections that were disconnected.

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DRAIN AND CLEAN THE HYDRAULIC OIL TANK (CONTINUED)

NOTICE

Before filling the tank be sure the funnel is clean and 200 mesh (or finer) screen is used to strain the hydraulic oil.

13. Fill tank with recommended oil, checking the sight gauge as you fill. Refer to **Hydraulic Oil Specifications** 16.
14. Check the entire system to make sure all connections are tight and no leaks are found.
15. Start the truck's engine and engage the pump.

⚠ WARNING

Moving equipment can be dangerous to bystanders. Serious injury or death can occur if a person is in the wrong area or is not attentive to the operations. Clear the area of all unnecessary people before you operate the controls.

16. Operate the packing panel through 10 cycles to be sure all air is out of the circuits.
17. Operate the automated container lift mechanism.
18. Operate tailgate – full up and full down.
19. Operate body raise (dump units) – full up and full down.
20. With the packing panel in the retracted position and lift in the in-transit position, check tank oil level. If necessary, add recommended as described under **Check Oil Level** 83.

PURGE THE HYDRAULIC SYSTEM

If the hydraulic system becomes contaminated because of component failure or some other reason, you must purge the hydraulic system.

To purge the system, follow these steps:

1. Extend the packer/ejector cylinder to lower the oil level in the tank.
2. Remove and replace the in-tank oil filter element in the tank.
3. Engage the packer/ejector control lever and allow the oil to circulate through the new filter, cleaning the oil.

NOTICE

Before filling the tank be sure the funnel is clean and 200 mesh (or finer) screen is used to strain the hydraulic oil.

4. Repeat the procedure as necessary until the system is purged.

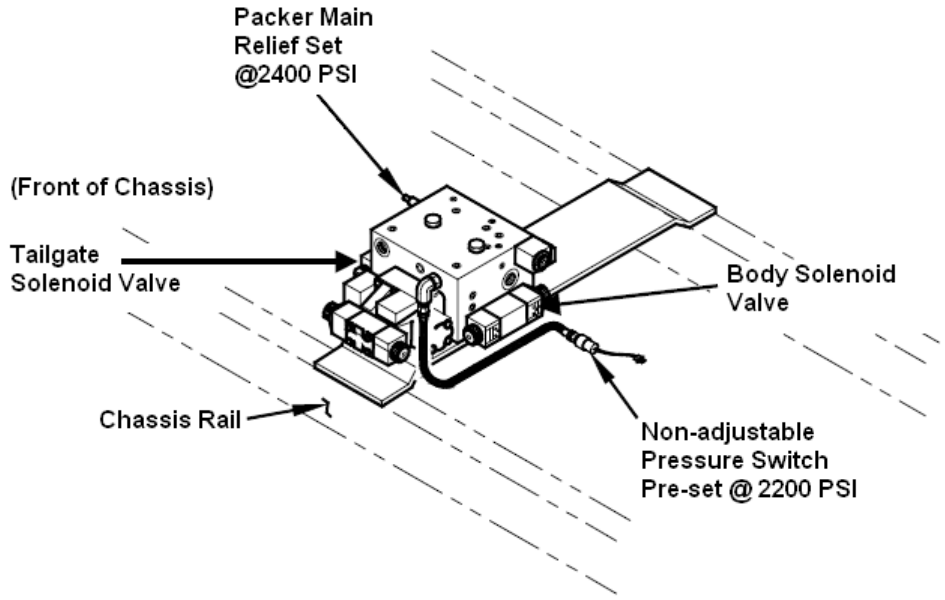
NOTICE

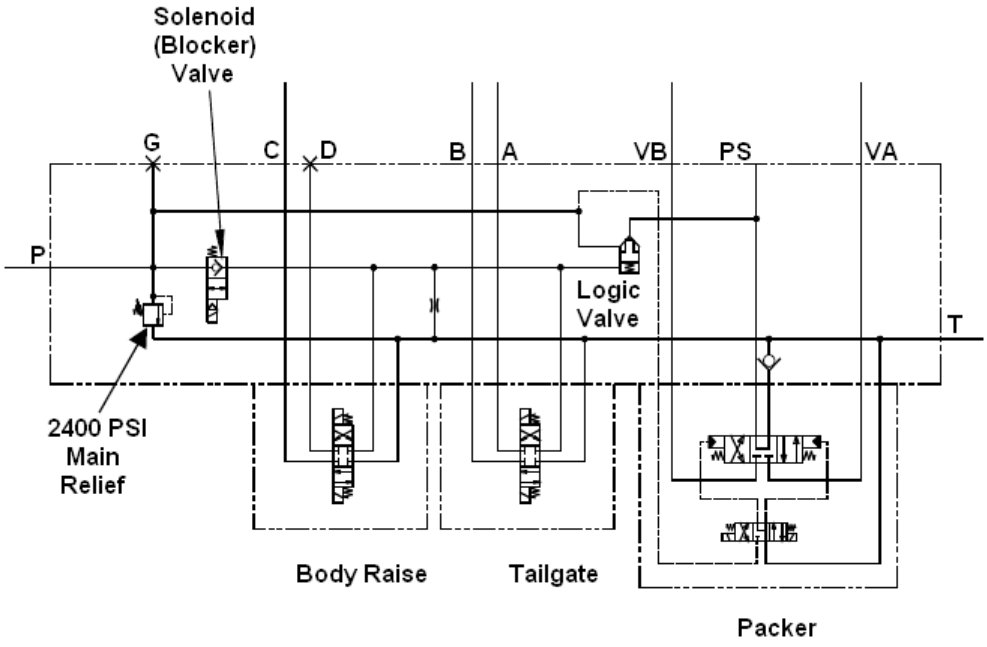
If contaminated hydraulic oil reaches the cylinders, the unit may need to be removed from service until the contamination is removed. For more information, contact the Heil Technical Services.

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PACKER/BODY VALVE

The packer valve is located between the chassis rails and controls the packer panel left and right movements, body raise/lower and tailgate raise/lower functions.





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PACKER, TAILGATE, AND BODY VALVE TROUBLESHOOTING

Packer doesn't move

- Operate manual overrides on packer pilot valve.
- Packer now moves? – Check for electrical problems such as wiring, solenoid coil, and current from controller, or pressure switch failure.
- Packer doesn't move?
- Operate tailgate.
- Tailgate moves? – Replace solenoid (blocker) valve #4.
- Tailgate doesn't move? – Check for bad pump or relief valve #5

Packer operates but tailgate and/or body raise does not.

- Remove valve #4 and replace with an SAE-10 plug. Run truck BRIEFLY to operate the tailgate or body raise function. Shut truck down as soon as possible.
- Tailgate or body raise operates? – Check for wiring, bad coil or bad solenoid (blocker) valve #4.
- Tailgate or body raise doesn't operate?
- Start truck again and run BRIEFLY to operate manual overrides on tailgate or body raise valve. Shut truck down as soon as possible.
- Tailgate or body raise now moves? – Check for wiring, coil or controller problem.
- Tailgate doesn't move? – Replace logic valve #3

Packer operates but has insufficient force or speed

- Install pressure gage and "bottom out" the tailgate lower function.
- Main relief #5 should be set for 2400 PSI. Adjust as required.
- If 2400 PSI is not obtainable, replace relief valve #5. Then, if not obtainable, replace pump.

Packer blade "falls away" while body is elevated

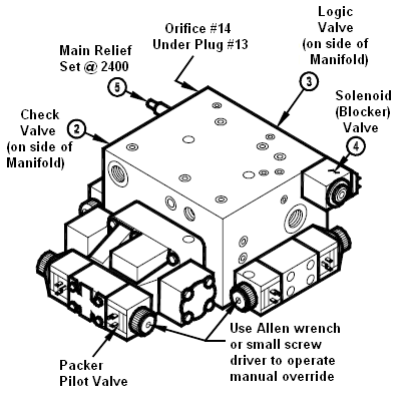
- Replace check valve #2

Packer operates OK, but is slow to start after operation of tailgate or body raise.

- Clean orifice #14.

NOTICE

If spools are sticking, operation of manual overrides can free them.



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REPAIRING CRACKED WELD JOINTS

Repair all cracked weld joints immediately after finding cracked weld joints. If you are unsure of the proper repair procedure, call Heil Technical Services at 866-310-4345.

OIL LUBRICANT RECOMMENDATION

Use only non-detergent engine oil to lubricate all moveable mechanical parts not furnished with grease fittings. Apply sufficient oil to give good lubrication, but do not bathe parts in oil. Always wipe off excess.

GREASE LUBRICANT RECOMMENDATION

Use a grease gun. Before engaging grease gun, clean the fitting. Always pump enough grease to purge the joint of contaminated grease and wipe off the excess. Lubricate a unit as given on the lubrication decal on the unit and in the Body Lubrication Guide 79 paragraph of this section.

Use grade NLG1000 grease or equivalent.

TAILGATE LUBRICATION

See **Grease Lubrication Recommendation** 88 and **Body Lubrication Guide** 79 in this section.

INSPECT PROXIMITY SWITCHES

See **Proximity Switch Troubleshooting** 28 for recommended procedures for inspecting proximity switches.

CLEAN AND INSPECT THE TAILGATE SEAL

Periodically check the tailgate seal to make sure it mates properly with the body and inspect for possible wear, damage or leaking. Replace the seal as necessary. See the figure below.

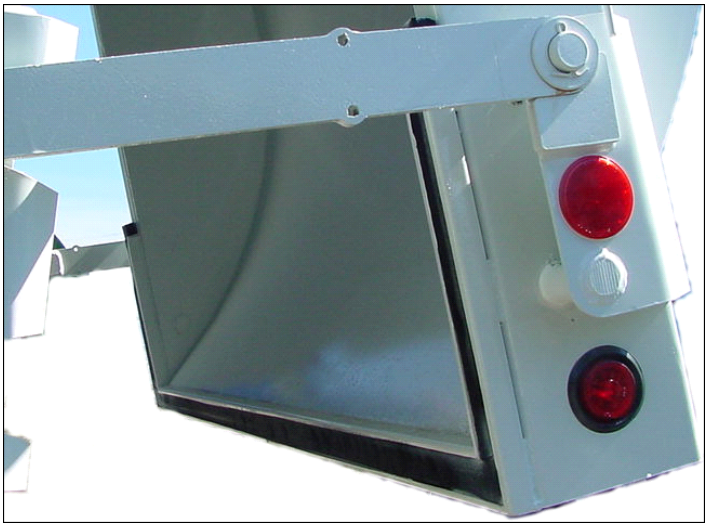


Figure 33. Tailgate Seal

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SECTION 6
BODY CONTROLLER HARDWARE

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BODY CONTROLLER

The Body Controller is mounted inside the street side hoist cylinder bracket.

Mounted with the body controller are the relays that control the hoist raise/lower and tailgate raise/lower.

LED COLOR	STATUS	DESCRIPTION
N/A	OFF	No Supply Voltage
Red/Green	1 Flash	Initialization
Red/Green	Flash @ .5 Hz	Communications Lost
Green	Flash @ 5 Hz	No Operating System Loaded
Green	Flash @ 2 Hz	Application Running (RUN MODE)
Green	Continuous	Application Stop (STOP MODE)
Red	Flash @ 5 Hz	Supply Voltage Low
Red	Flash @ 10 Hz	Fatal Error

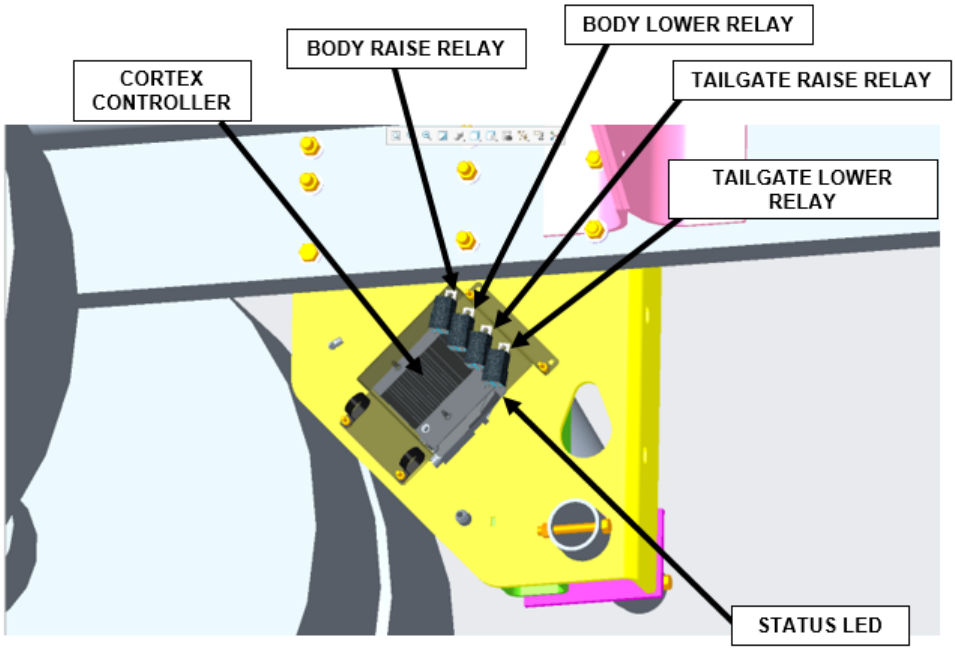


Figure 34. Body Controller Location

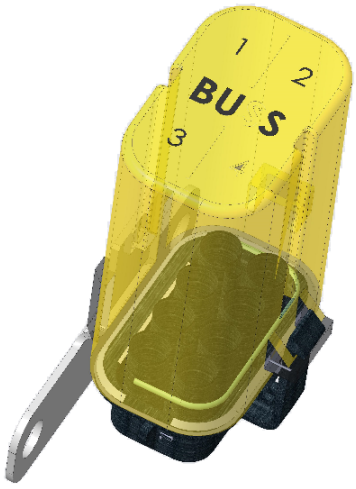


Figure 35. Body Controller

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CONTROL FUSES

Fuse holder is located under the dog house cover, in the cab to body harness, near the Connector D1.



FUSE	AMPERAGE	CIRCUIT
F1	20A	Body Controller Power (Pin10)
		Cab Controller Power (Pin10)
		InSight™ Display
		Switch Banks
		System Power Input
		Auxiliary Control Lift Control
		Sensor Power
F2	15A	Cab Controller Output Power 08-15 (Pin1)
F3	15A	Body Controller Output Power 00-07 (Pin19)
		Body Valve Relay Output Power
F4	15A	Cab Controller Output Power 00-07 (Pin19)
		Body Controller Output Power 08-15 (Pin1)

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SECTION 7
BODY CONTROLLER SOFTWARE

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CONTROL AREA NETWORK (CAN)

The control system for the 2018 Liberty has multiple components that communicate via messaging over Control Area Networks or CAN.

a. Body Controller (32 I/O Cortex Control Module)
b. Cab Controller (32 I/O Cortex Control Module)
c. Insight Display
d. Control panel Switch Bank(s)
e. Chassis J1939 interface.

There are three discrete networks in the system.

CAN1 Network

- Communications between the Body Controller, Cab Controller and Insight Display.

DEV-J1939 Network

- Communications between the Body Controller and switch banks or other devices that may be added.

CH-J1939 Network

- Communications between the Cab Controller and the truck chassis J1939.

Baud Rates

The baud rate setting determines the speed at which messages are transmitted between devices. The baud rate setting for all devices on the network must match.

a. CAN1 – 250K fixed
b. DEV-J1939 – 250K fixed
c. CH-J1939 –250K or 500K adjust to match chassis J1939 network.

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BODY CONTROLLER INPUTS

INPUT	PIN#	DESCRIPTION
IN00	55	PACKER PRESS SW
IN01	36	SPARE
IN02	54	GRABBER PRESS SW
IN03	35	LIFT LOWERED PROX
IN04	53	OIL TEMP
IN05	34	HOPPER COVER PROX
IN06	52	SIDE DOOR PROX
IN07	33	TAILGATE CLOSED PROX
IN08	24	BODY DOWN PROX
IN09	41	PACKER PROX
IN10	23	SPARE
IN11	40	BODY RAISE LIMIT SW
IN12	22	FILTER PRESS SW
IN13	39	LOW OIL SW
IN14	21	LIFT RETRACTED PROX
IN15	38	GRABBER OPEN PROX
VBBS	10	SUPPLY VOLTAGE CONTROLLER
VBB1	19	SUPPLY VOLTAGE OUTPUT 00-08
VBB2	1	SUPPLY VOLTAGE OUTPUT 08-15
N/A	N/A	CONTROLLER TEMP
N/A	N/A	CAN OPEN CYCLE TIME
N/A	N/A	CORTEX PROGRAM



Figure 36. Body Controller Inputs

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CAB CONTROLLER INPUTS

INPUT	PIN#	DESCRIPTION
IN00	55	HOPPER COVER RAISE
IN01	36	HOPPER COVER LOWER
IN02	54	TRANS TEMP SIG
IN03	35	SECONDARY CONTROL SIG
IN04	53	TURN SIG
IN05	34	SERVICE BRAKE
IN06	52	SPARE
IN07	33	NEUTRAL SIG
IN08	24	SYSTEM POWER SW
IN09	41	PUMP ENABLE PB
IN10	23	GRABBER CLOSE PB
IN11	40	GRABBER OPEN PB
IN12	22	ENGINE TACH SIG. (NOT USED)
IN13	39	SPARE
IN14	21	SPARE
IN15	38	SPARE
VBBS	10	SUPPLY VOLTAGE CONTROLLER
VBB1	19	SUPPLY VOLTAGE OUTPUT 00-08
VBB2	1	SUPPLY VOLTAGE OUTPUT 08-15
N/A	N/A	CONTROLLER TEMP
N/A	N/A	CAN OPEN CYCLE TIME
N/A	N/A	CORTEX PROGRAM
N/A	N/A	DISPLAY PROGRAM



Figure 37. Cab Controller Inputs

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SWITCH BANK INPUTS

DESCRIPTION
PUMP ENABLE SW1
MANUAL PACK SW1
AUTO LIFT ENABLE SW1
STROBE ENABLE SW1
WORK LIGHT SW1
PACK RIGHT SW1
PACK LEFT SW1
BODY RAISE SW1
BODY LOWER PSW1
TG RAISE SW1
TG LOWER SW1
PUMP ENABLE SW2
MANUAL PACK SW2
AUTO LIFT ENABLE SW2
STROBE ENABLE SW2
WORK LIGHT SW2
PACK RIGHT SW2
PACK LEFT SW2
BODY RAISE SW2
BODY LOWER PSW2
TG RAISE SW2
TG LOWER SW2



Figure 38. Switch Bank Inputs

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CHASSIS J1939 VARS

VARIABLE LIST	FUNCTIONALITY
PARK BRAKE	ON = PARK BRAKE SET
SERVICE BRAKE	ON = SERVICE BRAKE APPLIED
FORWARD GEAR	ON = TRANSMISSION IN FORWARD GEAR
REVERSE GEAR	ON = TRANSMISSION IN REVERSE GEAR
NEUTRAL	ON = TRANSMISSION IN NEUTRAL
TRANS. PTO CONSENT	ON = TRANSMISSION CONSENT TO ENGAGE HOT SHIFT PTO
LEFT TURN	ON = LEFT HAND TURN SIGNAL IS ACTIVE
RIGHT TURN	ON = RIGHT HAND TURN SIGNAL IS ACTIVE
ENGINE RPM	DISPLAYS ENGINE SPEED (rpm)
ENGINE % TORQUE	DISPLAYS ENGINE PERCENT TORQUE
ROAD SPEED	DISPLAYS VEHICLE SPEED (mph)
AMBIENT TEMP	DISPLAYS CURRENT AMBIENT TEMPERATURE
J1939 BUSS LOAD	DISPLAYS CHASSIS J1939 BUSS LOAD



Figure 39. Chassis J1939 Vars

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BODY CONTROLLER OUTPUTS

State of each output in brackets [ ].

All Outputs

[ON] - Output is On.

[OFF] - Output is Off.



Figure 40. Body Controller Outputs

Diagnostic features outputs 00 thru 07

[Disabled] - Output is disabled by option set or spare.

[Under Voltage on VBB] - Supply Voltage is too low.

[Over Voltage on VBB] - Supply Voltage is too high.

[Settings Invalid] - Program Error.

[Wire Break] - Open Circuits Detected

[Short Circuit] - Short Circuit Detected

[Over Current] - Overload on Circuit

Diagnostic features outputs 08 thru 15

[Disabled] - Output is disabled by option set or spare.

OUTPUT	PIN#	DESCRIPTION
OUT00	18	HOPPER COVER OPEN
OUT01	17	HOPPER COVER CLOSE
OUT02	16	BODY RAISE SOL
OUT03	15	BODY LOWER SOL
OUT04	14	TG RAISE SOL
OUT05	13	TG LOWER SOL
OUT06	12	DIVERTER SOL
OUT07	11	TG ALARM
OUT08	2	SPARE
OUT09	3	SPARE
OUT10	4	PACK LEFT SOL
OUT11	5	PACK RIGHT SOL
OUT12	6	SPARE
OUT13	7	LIFT RAISE ILOCK SOL
OUT14	8	LIFT RETRACT SOL
OUT15	9	LIFT RAISE SOL

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CAB CONTROLLER OUTPUTS

State of each output in brackets [ ].

All Outputs

[ON] - Output is On.

[OFF] - Output is Off.

Diagnostic features outputs 00 thru 07

[Disabled] - Output is disabled by option set or spare.

[Under Voltage on VBB] - Supply Voltage is too low.

[Over Voltage on VBB] - Supply Voltage is too high.

[Settings Invalid] - Program Error.

[Wire Break] - Open Circuits Detected

[Short Circuit] - Short Circuit Detected

[Over Current] - Overload on Circuit



Figure 41.Cab Controller Outputs

Diagnostic features outputs 08 thru 15

[Disabled] - Output is disabled by option set or spare.

OUTPUT	PIN#	DESCRIPTION
OUT00	18	GRABBER CLOSE SOL
OUT01	17	GRABBER OPEN SOL
OUT02	16	PTO SOL
OUT03	15	PUMP1 SOL
OUT04	14	PUMP2 SOL
OUT05	13	LIFT ENABLE SOL
OUT06	12	SECONDARY CONTROL ENABLE
OUT07	11	SPARE OUTPUT 7
OUT08	2	IN CAB ALARM 1
OUT09	3	IN CAB ALARM 2
OUT10	4	OUT OF DIM SIG
OUT11	5	HOPPER CAMERA TRIGGER
OUT12	6	STROBE 1
OUT13	7	WORK LIGHT 2
OUT14	8	STROBE 2
OUT15	9	WORK LIGHT 1

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PASSWORD PROTECTED SCREENS

To access password protected screens press and hold the OK button for 3 seconds.

This will switch the view to the password screen. Enter the password and press OK.

Passwords for Protected Screens:

- Maintenance Screen: 4321
- Option Settings Screen: 123412



Figure 42. Password Protected Screens

MAINTENANCE SCREEN

Service Mode is strictly intended to allow movement of the lift or packer blade while servicing or troubleshooting the unit. Service Mode overrides all interlocks and disables all automated operation of the Packer and Lift.

Daily Pack Cycle count – reset with OK button

Daily Arm Cycle count – reset with OK button

Maintenance Hours – reset with OK button

Service Mode – activated with OK button



Figure 43. Maintenance Screen

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OPTION SETTING SCREEN

Press the OK button to change option setting. Press the escape button to exit screen.



Figure 44. Option Configuration

J1939 Baud Rate - 250/500 - Setting should match chassis baud rate. Does not require added hardware.

Hot Shift PTO - On/Off - ON, Enables Hot shift PTO functionality and PTO Solenoid Output. Only used when Hot shift PTO in installed.

Low Oil Detection - On/Off - ON, Enables Low Oil Detection and Pump shutdown when oil level is low. Requires installation of level sensor in oil tank.

Oil Temp Detection - On/Off - ON, Enables Oil Temp Detection and Pump shutdown when oil temp is high.Requires installation of temperature transducer in oil tank.

No Side Door - On/Off (Default ON) - ON, Disables side door interlock and pump shutdown. To be turned OFF when optional side access door is not installed.

Grabber Open lock - On/Off - ON, Enables interlock preventing grabber from opening with the lift raised. Requires additional hardware to determine lift raised position.

Lift Raise lock - On/Off - ON, Enables interlock preventing lift from raising with grabber open. Requires additional hardware to determine lift raised and grabber closed.

Hyd Hopper Cover - On/Off - ON, Enables circuits for optional hydraulic hopper cover. Only used when Hydraulic Hopper option in installed.

Hopper Cover Indicator - On/Off - ON, Enables circuits for hopper cover indicator. When included with Lift Raise Interlock prevents lift from raising with cover closed. Only used when Hydraulic Hopper option in installed.

Enable Lift Stow - On/Off - ON, Enables automatic stow of lift when grabber open button is pressed. Does not require added hardware.

Operation Speed Limit – 7 mph/12 mph - Sets the maximum vehicle speed for lift, hoist and tailgate operation. Does not require added hardware.

Enable Out of Dimension Signal - On/Off - ON, Enables the out of dimension signal indicating a lift or body component is not properly positioned for transit. Does not require added hardware.

Enable Dual JStick - On/Off - ON, Enables functionality for a secondary lift control joystick. Requires added hardware.

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CRITICAL FAULTS

Accessed from the Main screen by using the down directional arrow, this screen shows the status of all critical faults. Press escape button to exit.



Figure 45. Critcal Faults

Accessed from the Critical Faults screen by using the right directional arrow, this screen shows the status of all system faults. Press escape button to exit.



Figure 46. System Faults

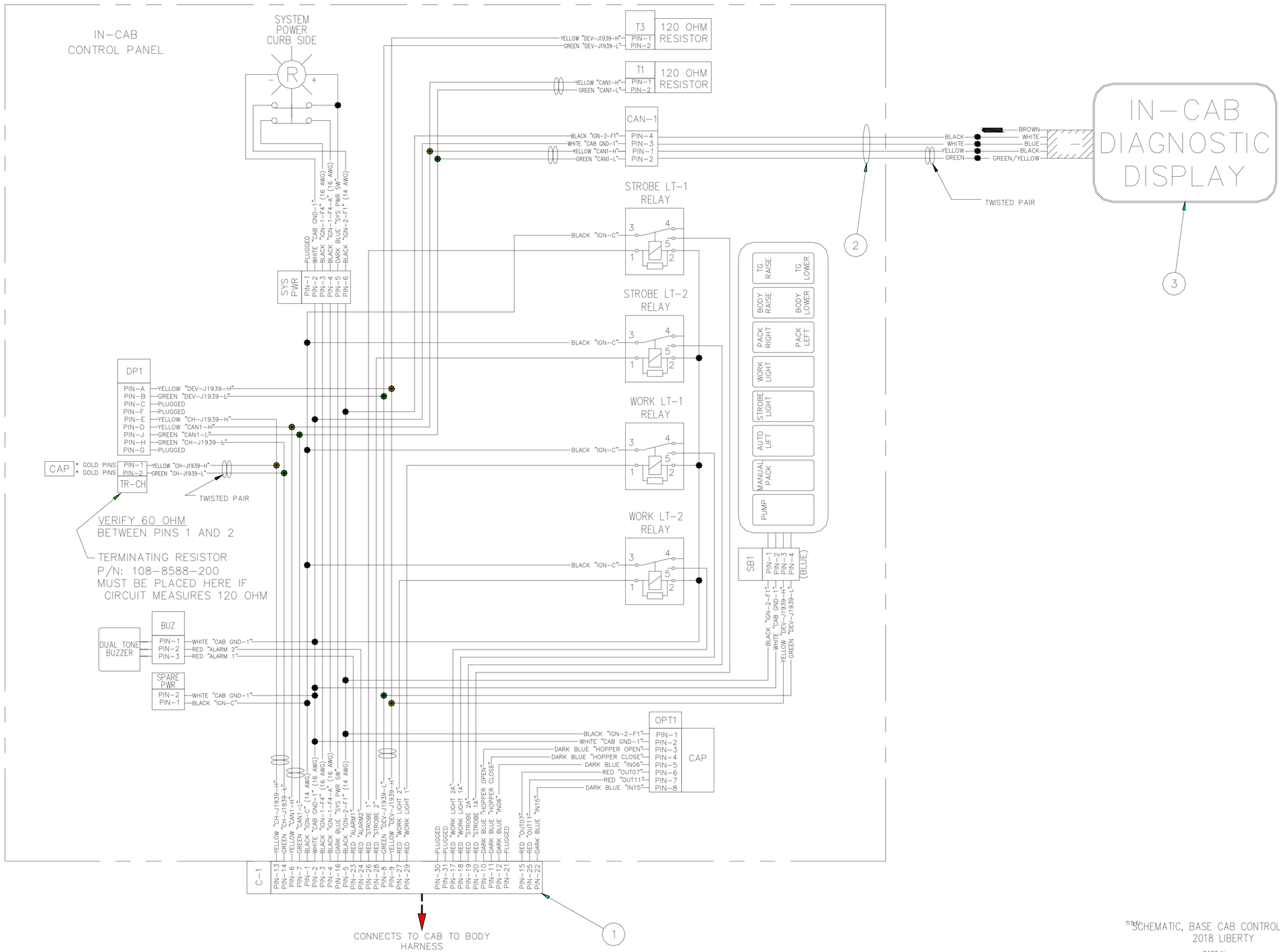
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SECTION 9
SCHEMATICS

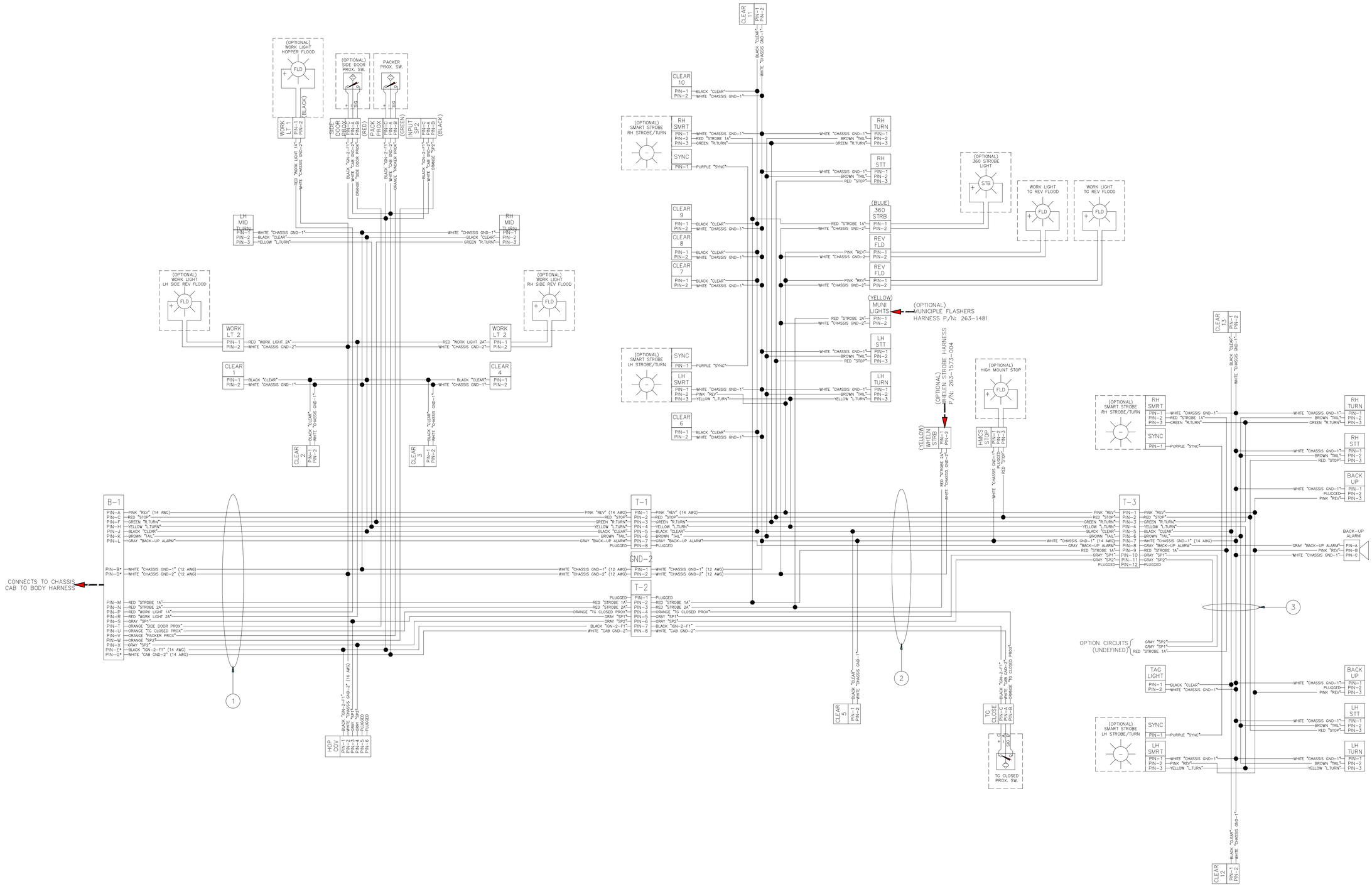
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TITLE: SCHEMATIC, BASE CAB CONTROL PANEL
2018 LIBERTY

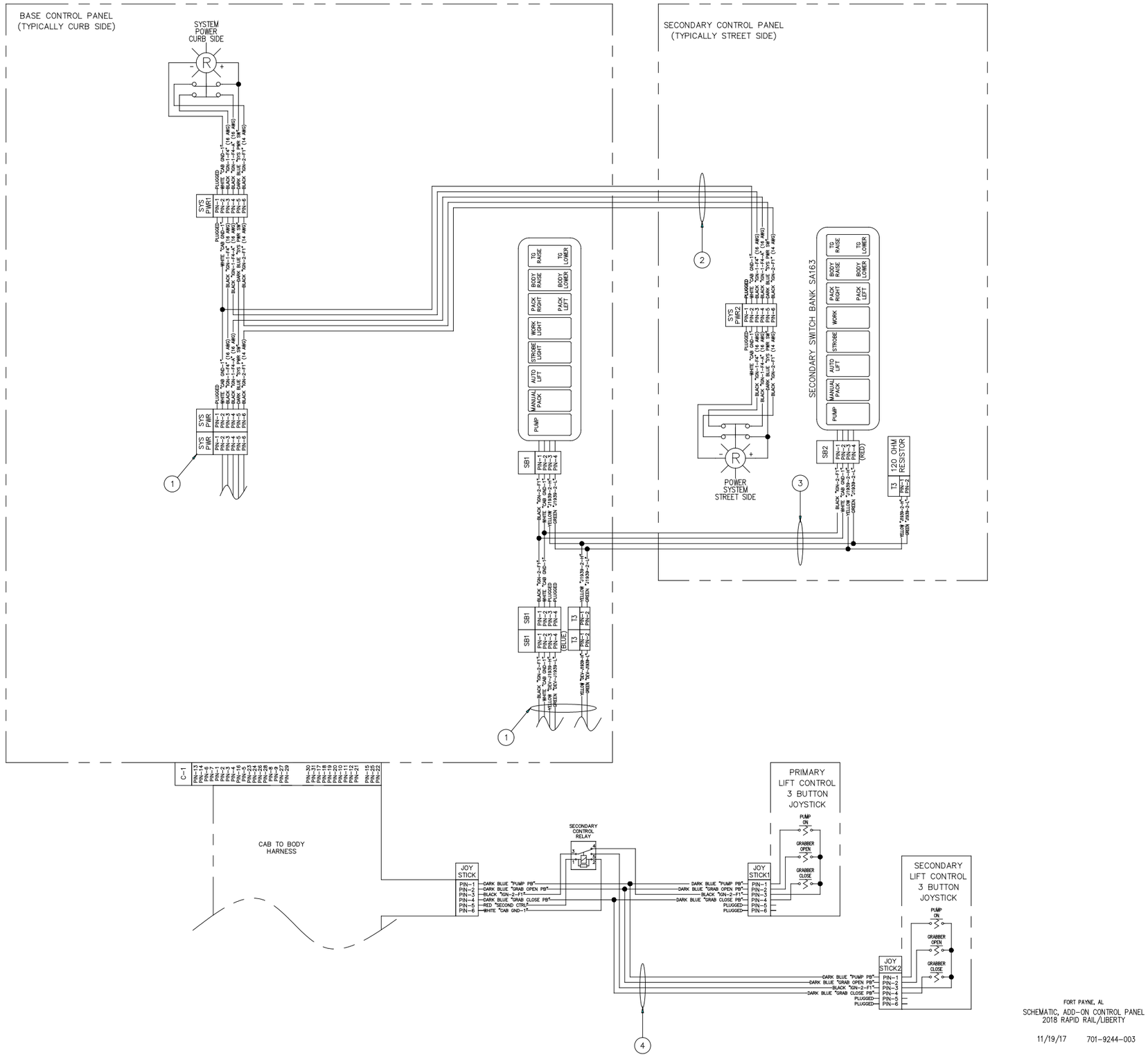
PART No. 701-9244-001

11/19/17



SCHEMATIC, BODY AND TAILGATE
2018 RAPID RAIL/LIBERTY

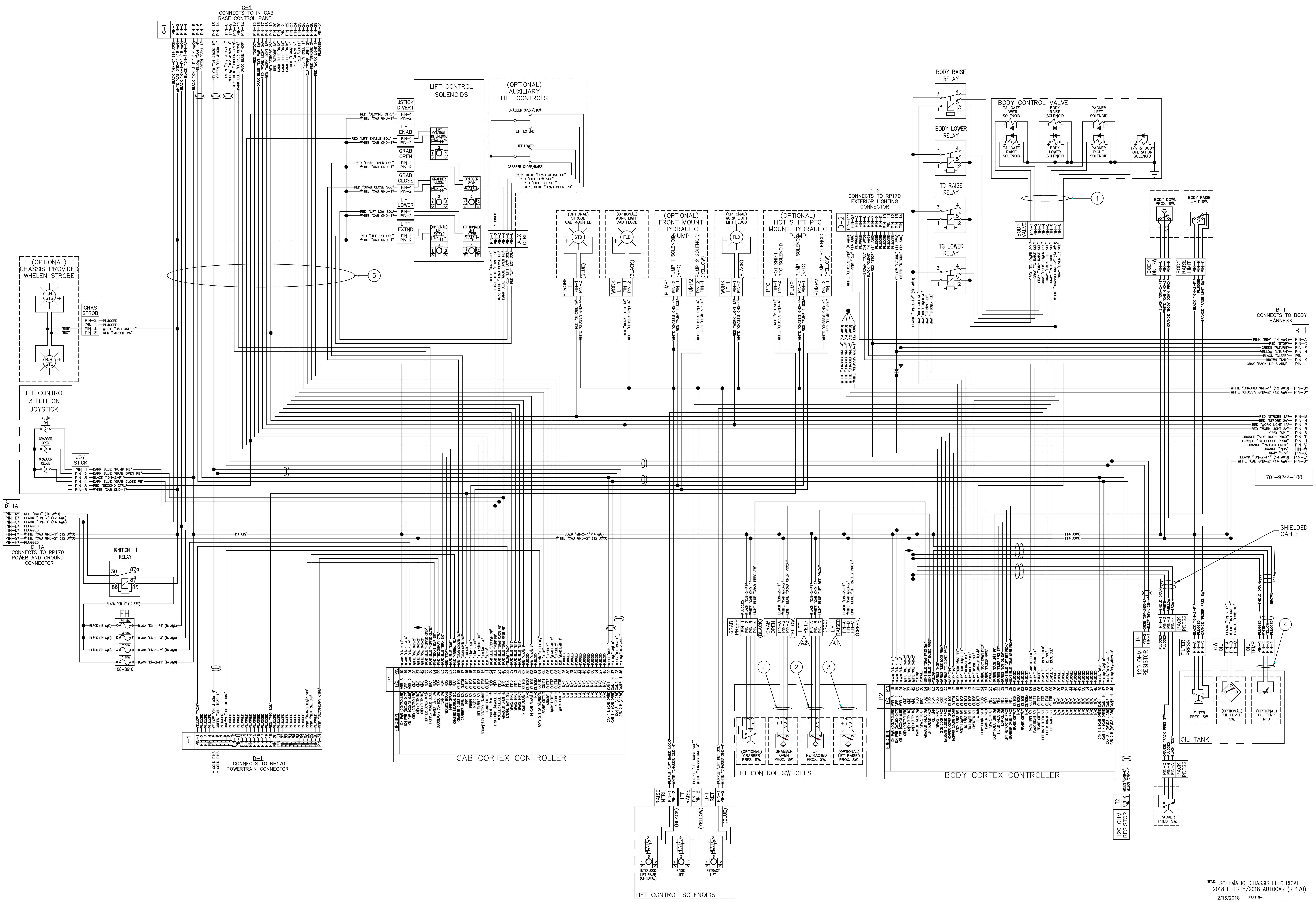
11/19/17 701-9244-002



FORT PAYNE, AL

SCHEMATIC, ADD-ON CONTROL PANEL
2018 RAPID RAIL/LIBERTY

11/19/17 701-9244-003



TITLE: SCHEMATIC, CHASSIS ELECTRICAL
2018 LIBERTY/2018 AUTOCAR (RP170)

2/15/2018 PART No.
Rev A2 701-9244-100

REF.	PART No.	DESCRIPTION	QTY.
1	. 263-1040	HARNESS, PACKER RR W/VICKERS PKR	REF
2	. 263-1145	CABLE, PROX. SWITCH, W/ 3PIN DEUTSCH	REF
3	. 263-1146	CABLE, INPUT DEVICE, W/ 3PIN DEUTSCH	REF
4	. 263-1763	HARNESS, MTS SENSOR PIGTAIL	REF
5	. 263-1828-102	HARNESS, CAB TO BODY, MACK LR	REF

C-1
CONNECTS TO IN CAB
BASE CONTROL PANEL

(OPTIONAL)
CHASSIS PROVIDED
WHELEN STROBE

LIFT CONTROL
3 BUTTON
JOYSTICK

IGNITION -1
RELAY

FH

108-8610

LIFT CONTROL
SOLENOIDS

(OPTIONAL)
AUXILIARY
LIFT CONTROLS

(OPTIONAL)
STROBE
CAB MOUNTED

(OPTIONAL)
WORK LIGHT
CAB FLOOD

(OPTIONAL)
FRONT MOUNT
HYDRAULIC
PUMP

(OPTIONAL)
WORK LIGHT
LIFT FLOOD

(OPTIONAL)
HOT SHIFT PTO
MOUNT HYDRAULIC
PUMP

D-2
CONNECTS TO BODY LINK
EXTERIOR LIGHTING
CONNECTOR

BODY RAISE
RELAY

BODY LOWER
RELAY

TG RAISE
RELAY

TG LOWER
RELAY

BODY CONTROL VALVE

BODY DOWN
PROX. SW.

BODY RAISE
LIMIT SW.

B-1
CONNECTS TO BODY
HARNESS

701-9244-102

D-1
CONNECTS TO BODY LINK
POWERTRAIN CONNECTOR

CAB CORTEX CONTROLLER

LIFT CONTROL SWITCHES

LIFT CONTROL SOLENOIDS

BODY CORTEX CONTROLLER

120 OHM
RESISTOR

FILTER
PRES. SW.

OIL TANK

(OPTIONAL)
OIL LEVEL
SW.

(OPTIONAL)
OIL TEMP
RTD

PACKER
PRES. SW.

SHIELDED
CABLE

SCHEMATIC, CHASSIS ELECTRICAL
2018 LIBERTY/MACK LR/MRU

05/20/18 701-9244-102
REV -

REF.	PART No.	DESCRIPTION	QTY.
1	. 263-1040	HARNESS, PACKER RR W/VICKERS PKR	REF
2	. 263-1145	CABLE, PROX. SWITCH, W/ 3PIN DEUTSCH	REF
3	. 263-1146	CABLE, INPUT DEVICE, W/ 3PIN DEUTSCH	REF
4	. 263-1471-008	HARNESS, CHASSIS INTERFACE, INTERN.	REF
5	. 263-1471-009	HARNESS, CHASSIS INTERFACE, INTERN.	REF
6	. 263-1517	HARNESS, BATTERY BOX	REF
7	. 263-1518	HARNESS, BATTERY	REF
8	. 263-1828-107	HARNESS, CAB TO BODY, INTERNATIONAL	REF
9	. 263-1763	HARNESS, MTS SENSOR PIGTAIL	REF

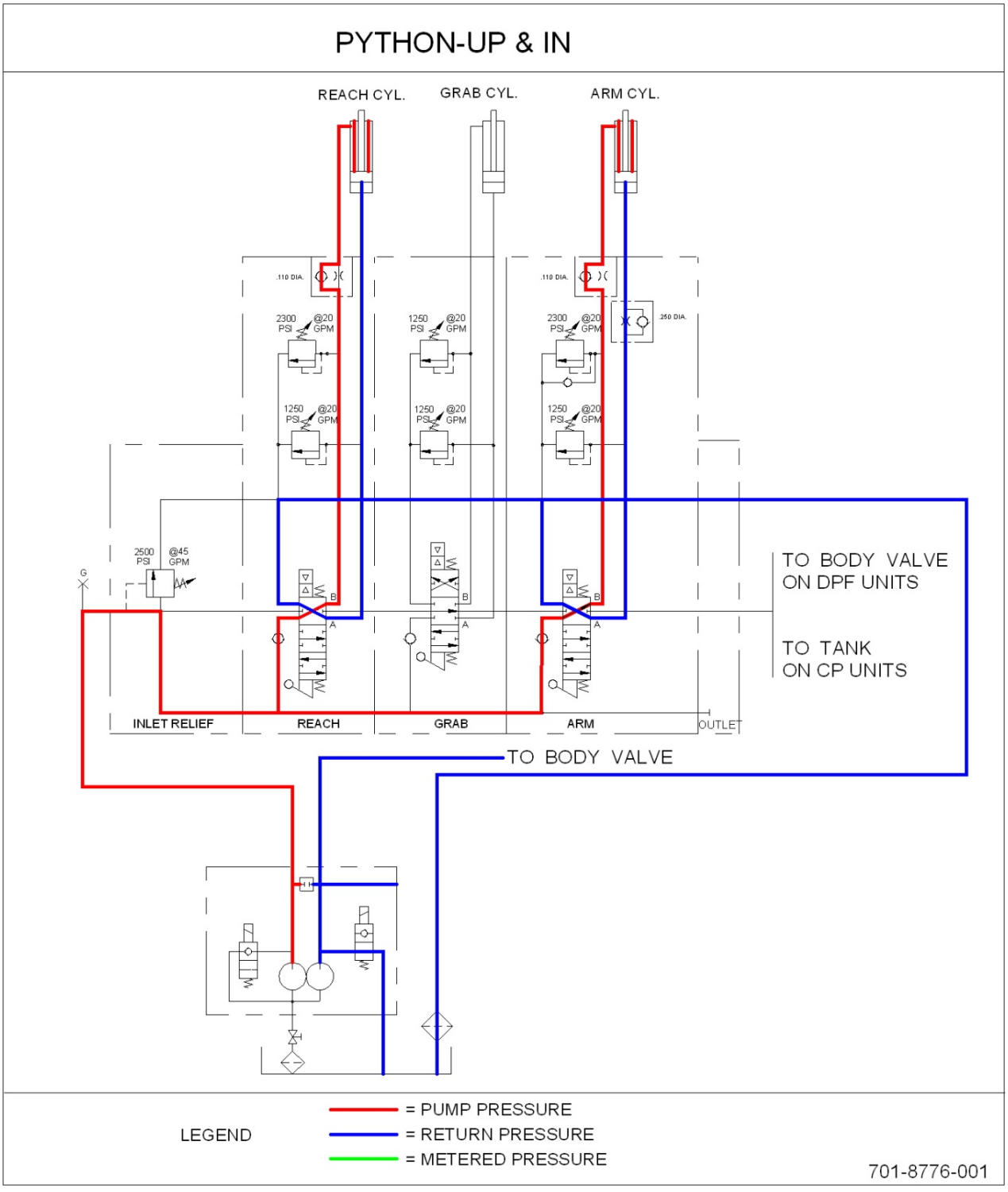
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12/07/18
REV -

SCHEMATIC, CHASSIS ELECTRICAL
2018 LIBERTY/INTERNATIONAL

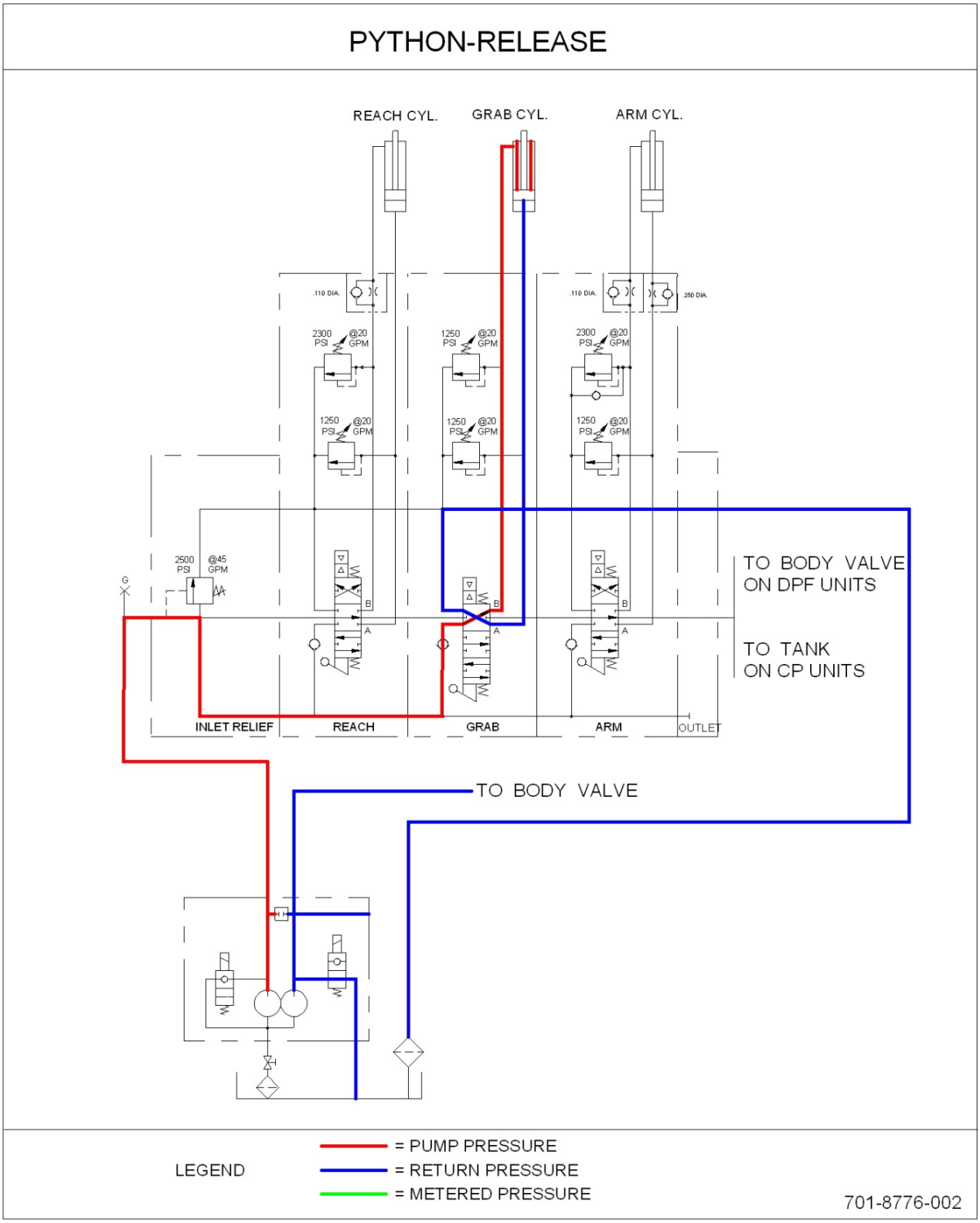
701-9244-107

LIFT ARM UP AND IN FLOW DIAGRAM - 701-8776-001



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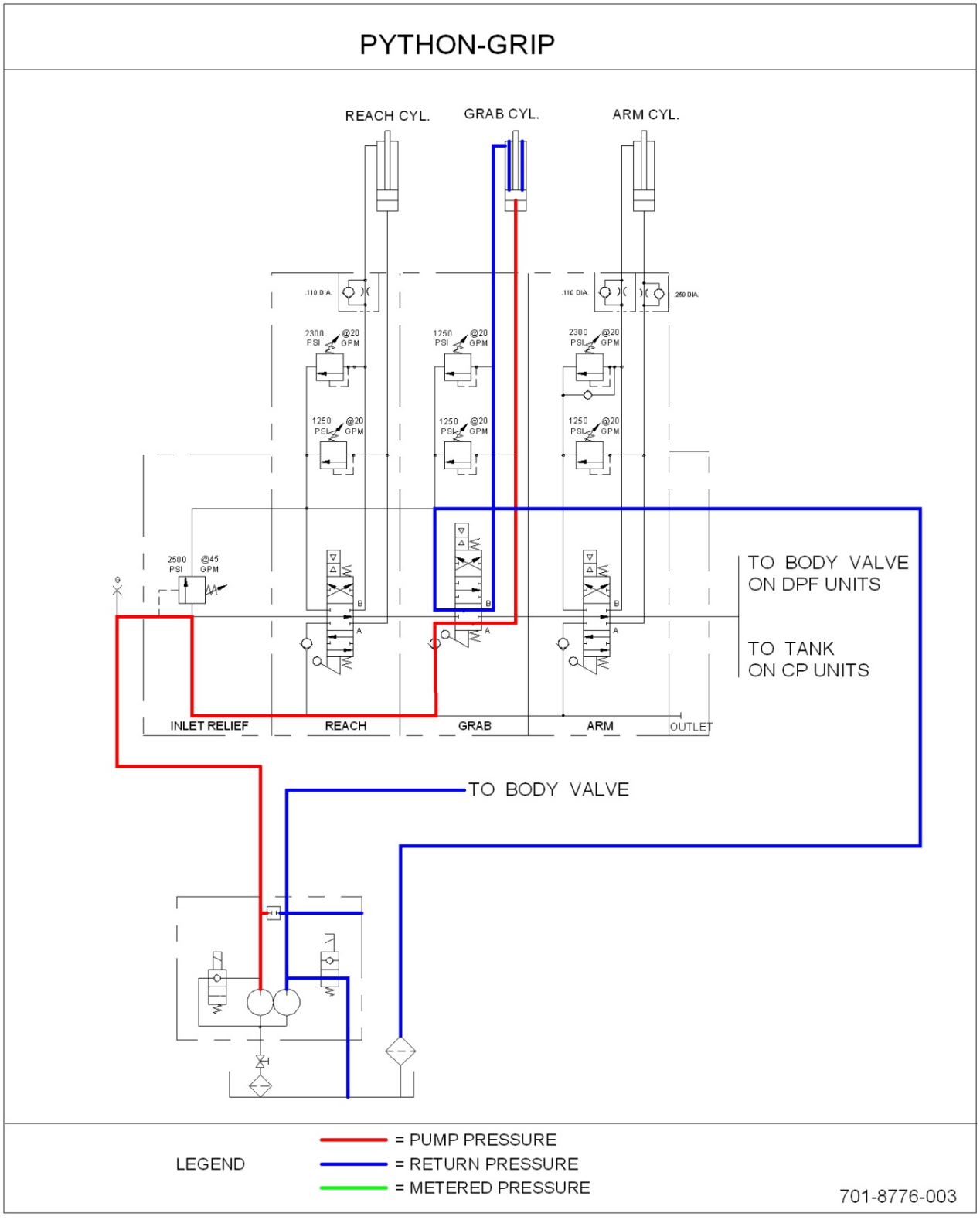
LIFT ARM RELEASE FLOW DIAGRAM - 701-8776-002



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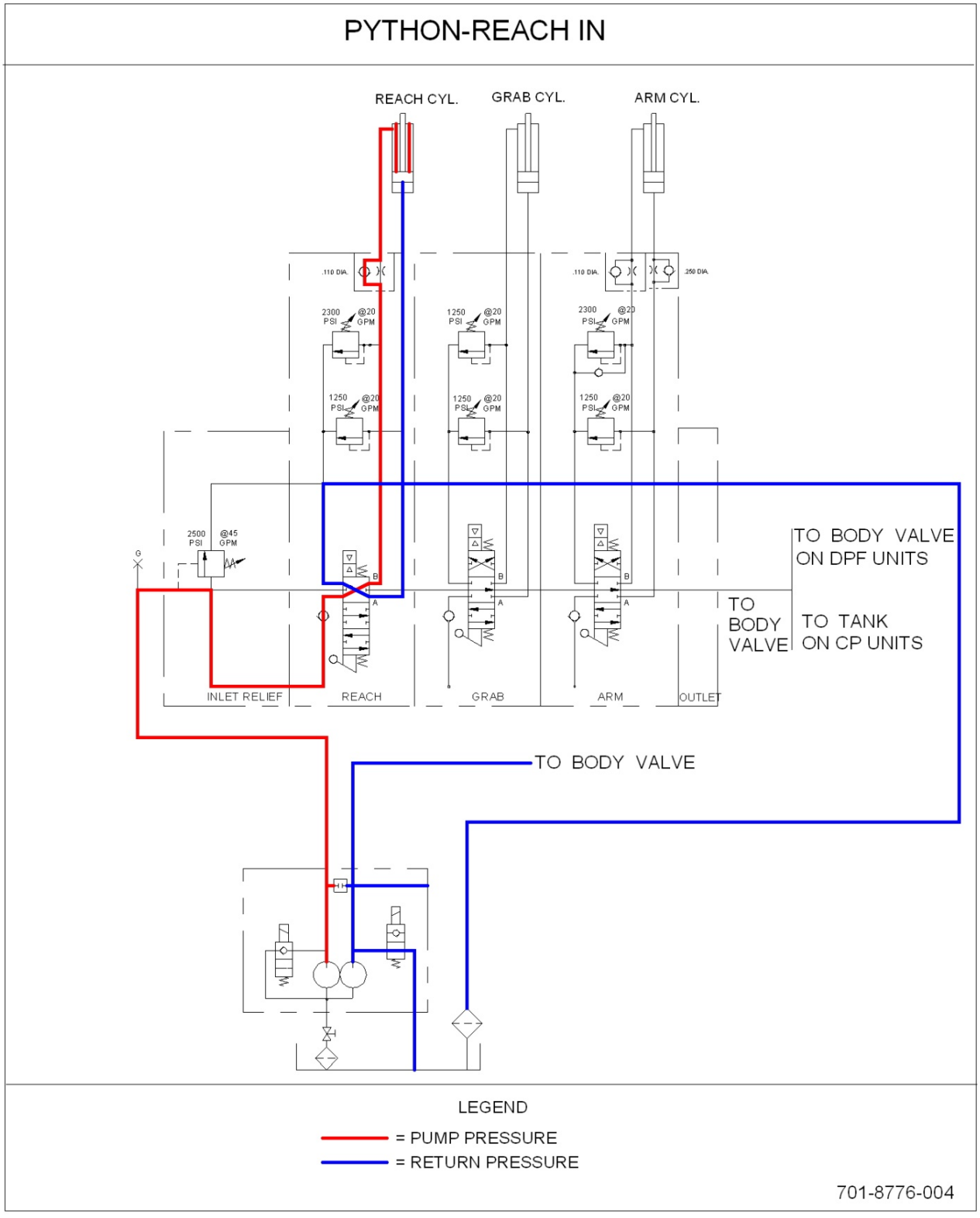
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Schematics

LIFT ARM GRAB FLOW DIAGRAM - 701-8776-003



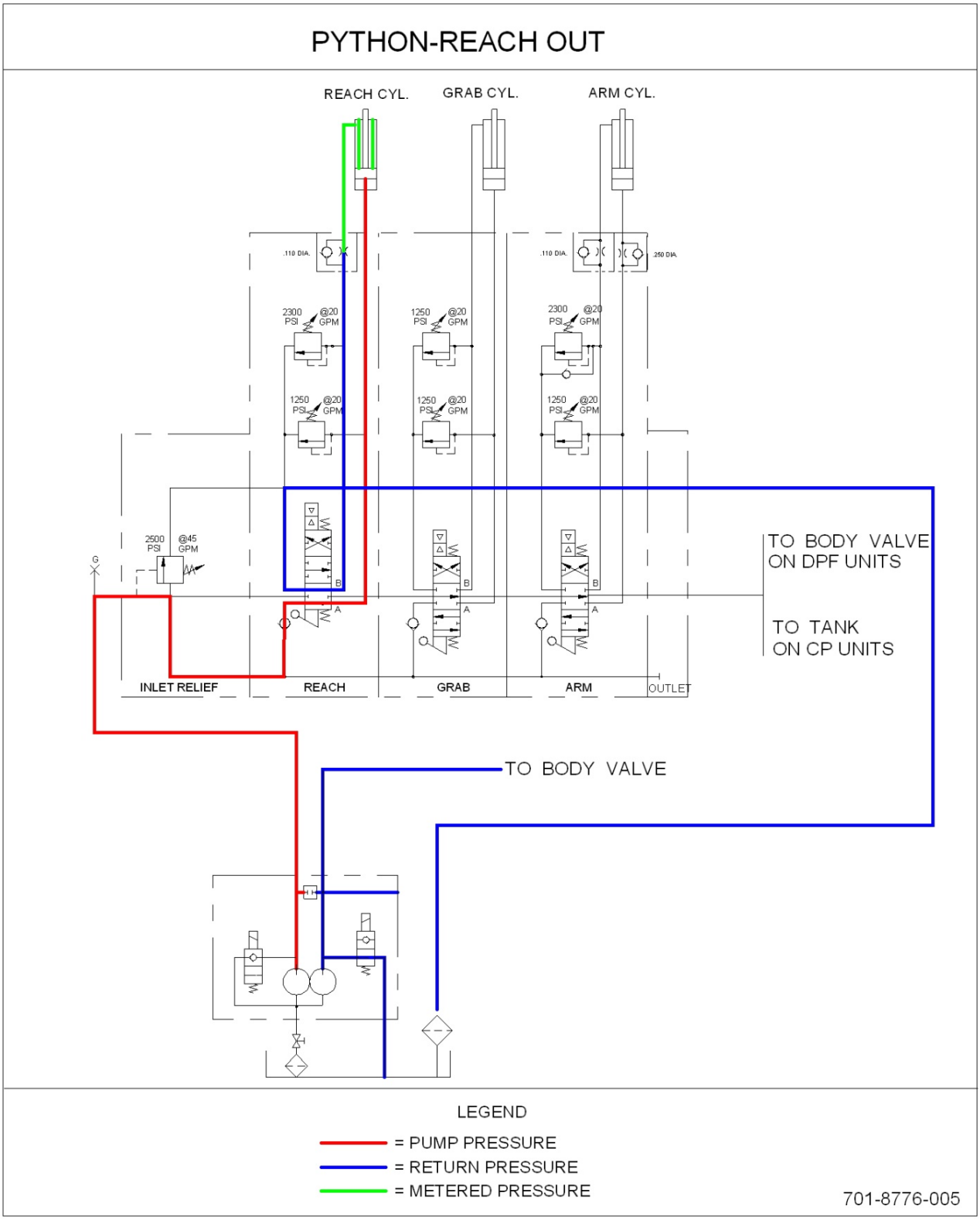
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LIFT ARM REACH IN FLOW DIAGRAM - 701-8776-004



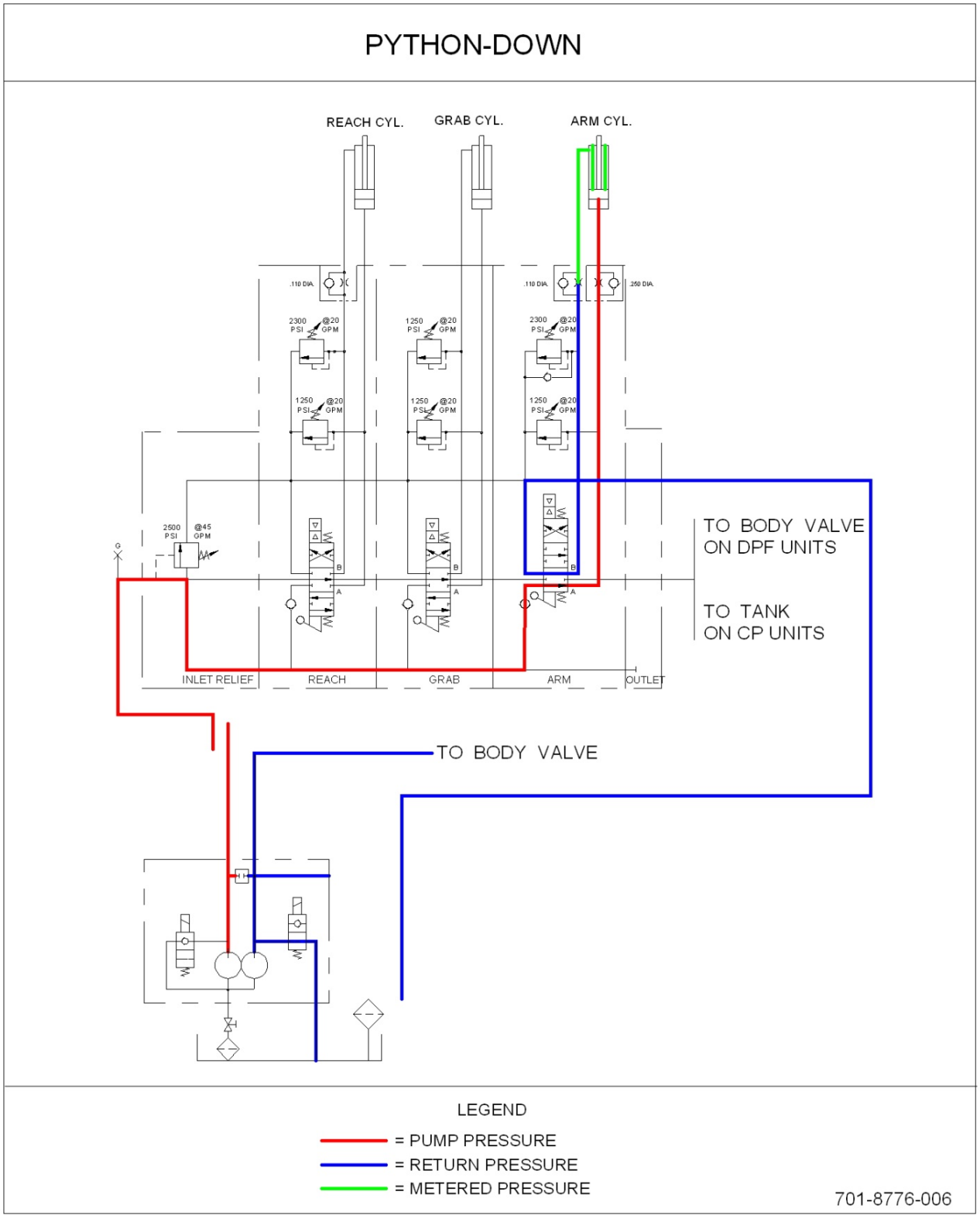
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LIFT ARM REACH OUT FLOW DIAGRAM - 701-8776-005

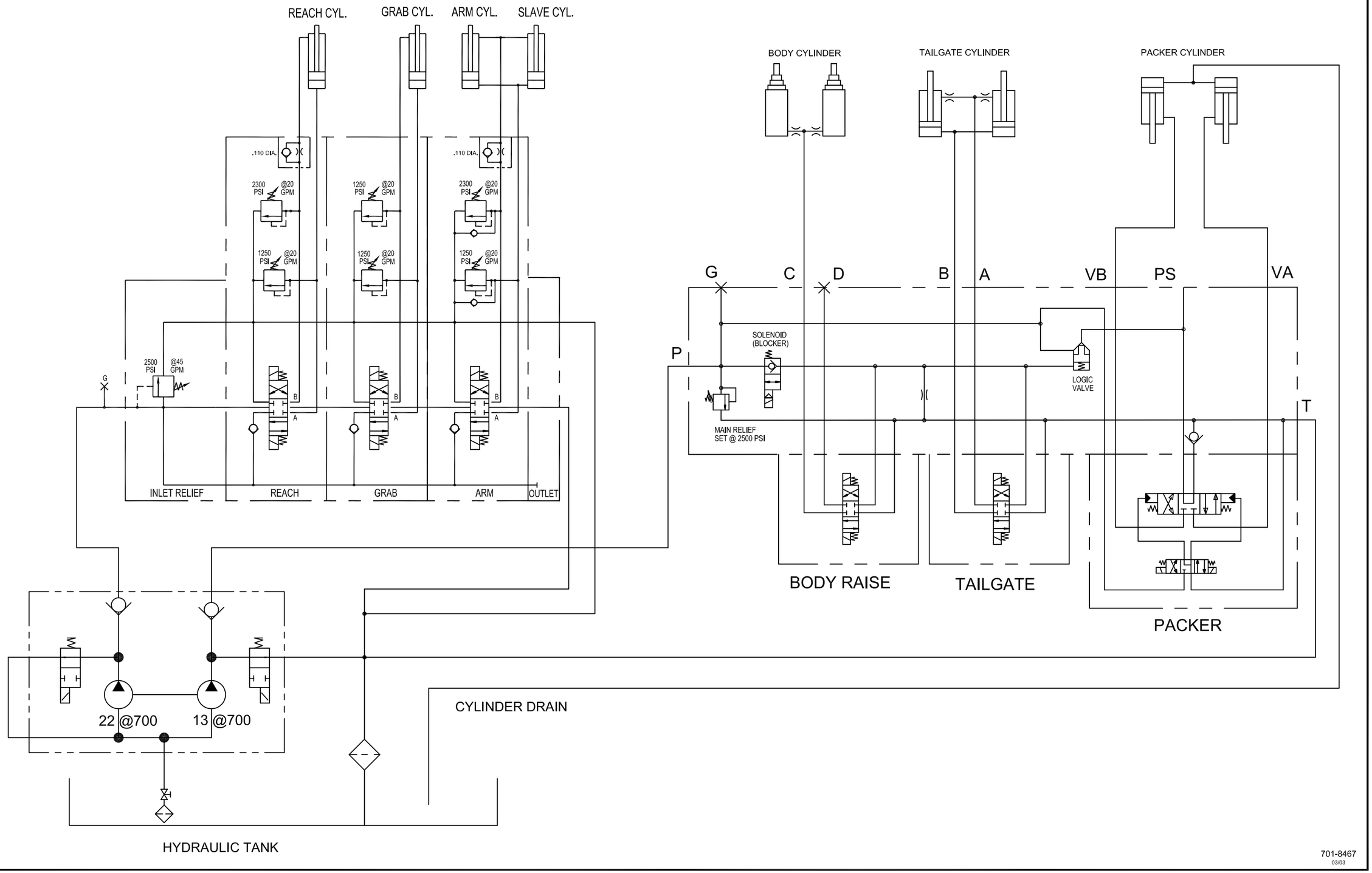


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LIFT ARM DOWN FLOW DIAGRAM - 701-8776-006

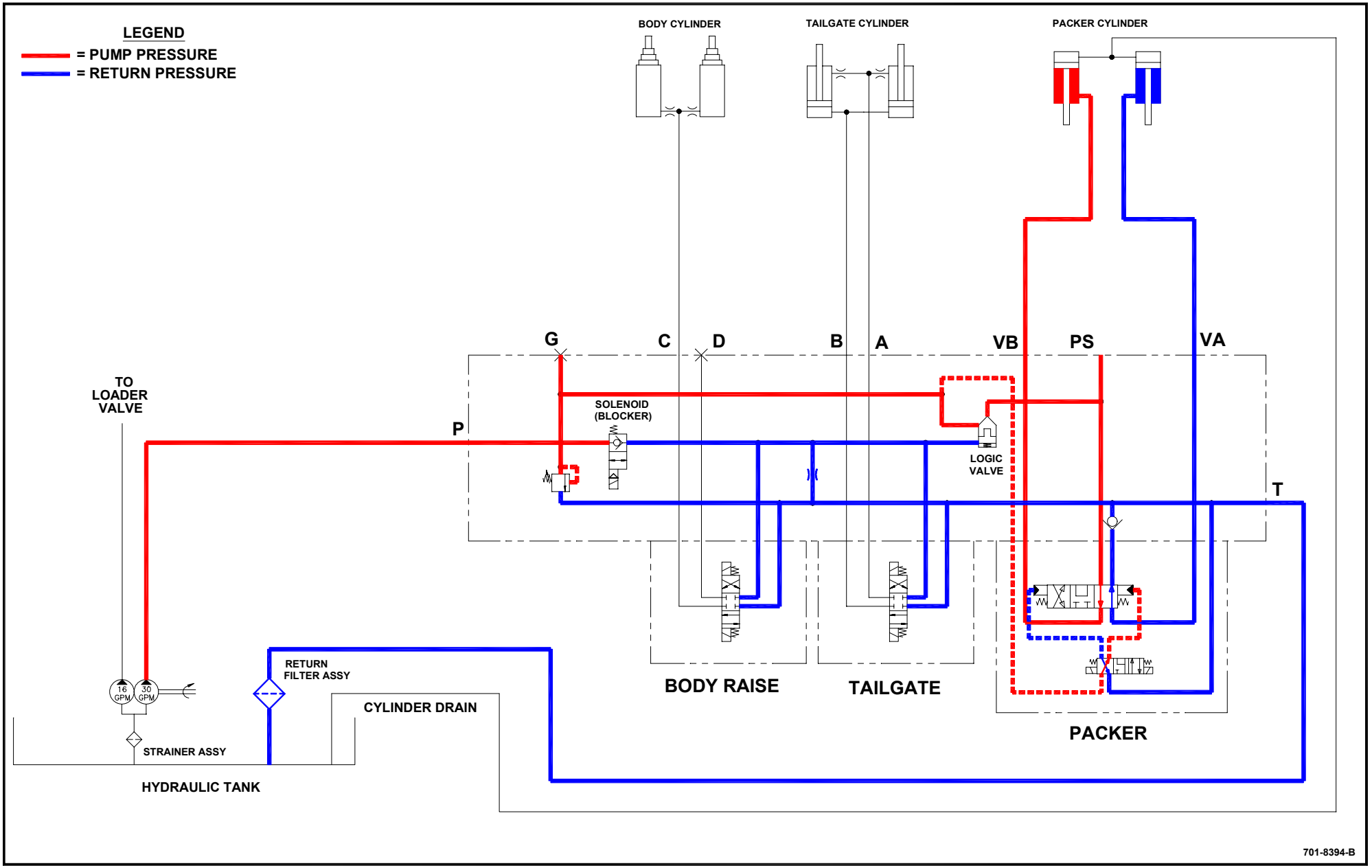


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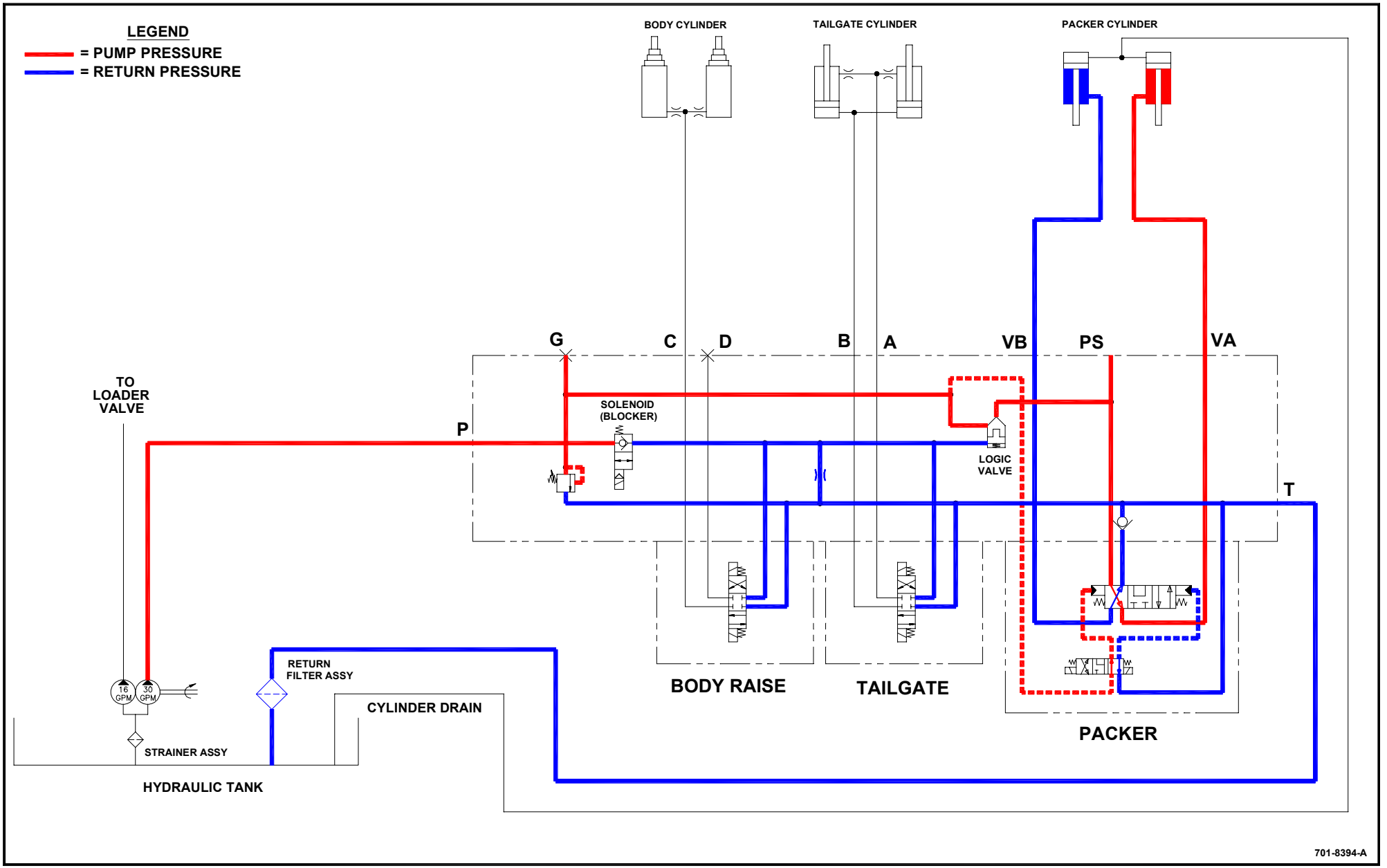


701-8467
03/03

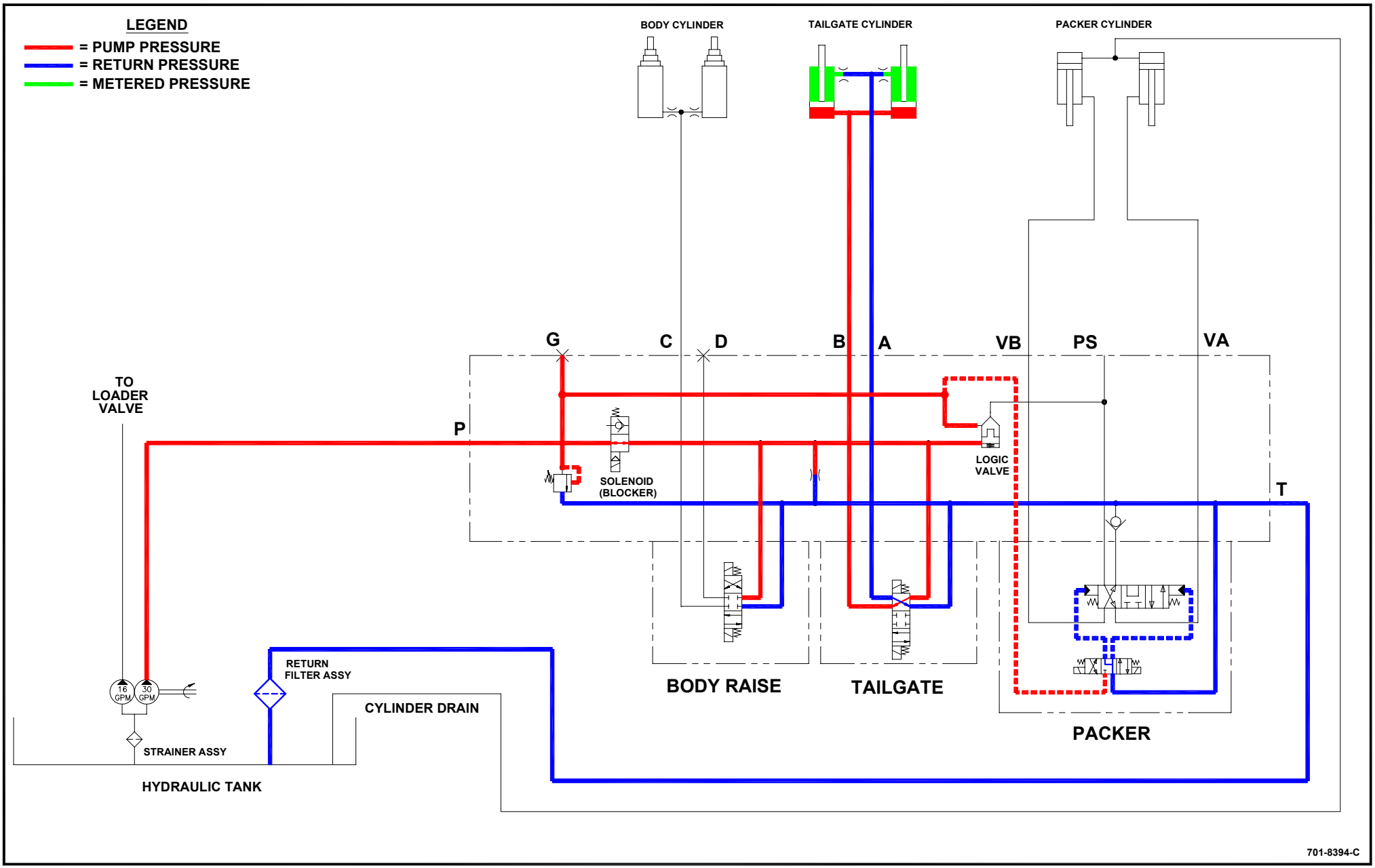
PACKER LEFT


LEGEND
= PUMP PRESSURE
= RETURN PRESSURE
BODY CYLINDER
TAILGATE CYLINDER
PACKER CYLINDER
G
C
D
B
A
VB
PS
VA
P
T
TO LOADER VALVE
SOLENOID (BLOCKER)
LOGIC VALVE
16 GPM
30 GPM
RETURN FILTER ASSY
CYLINDER DRAIN
STRAINER ASSY
HYDRAULIC TANK
BODY RAISE
TAILGATE
PACKER
701-8394-B

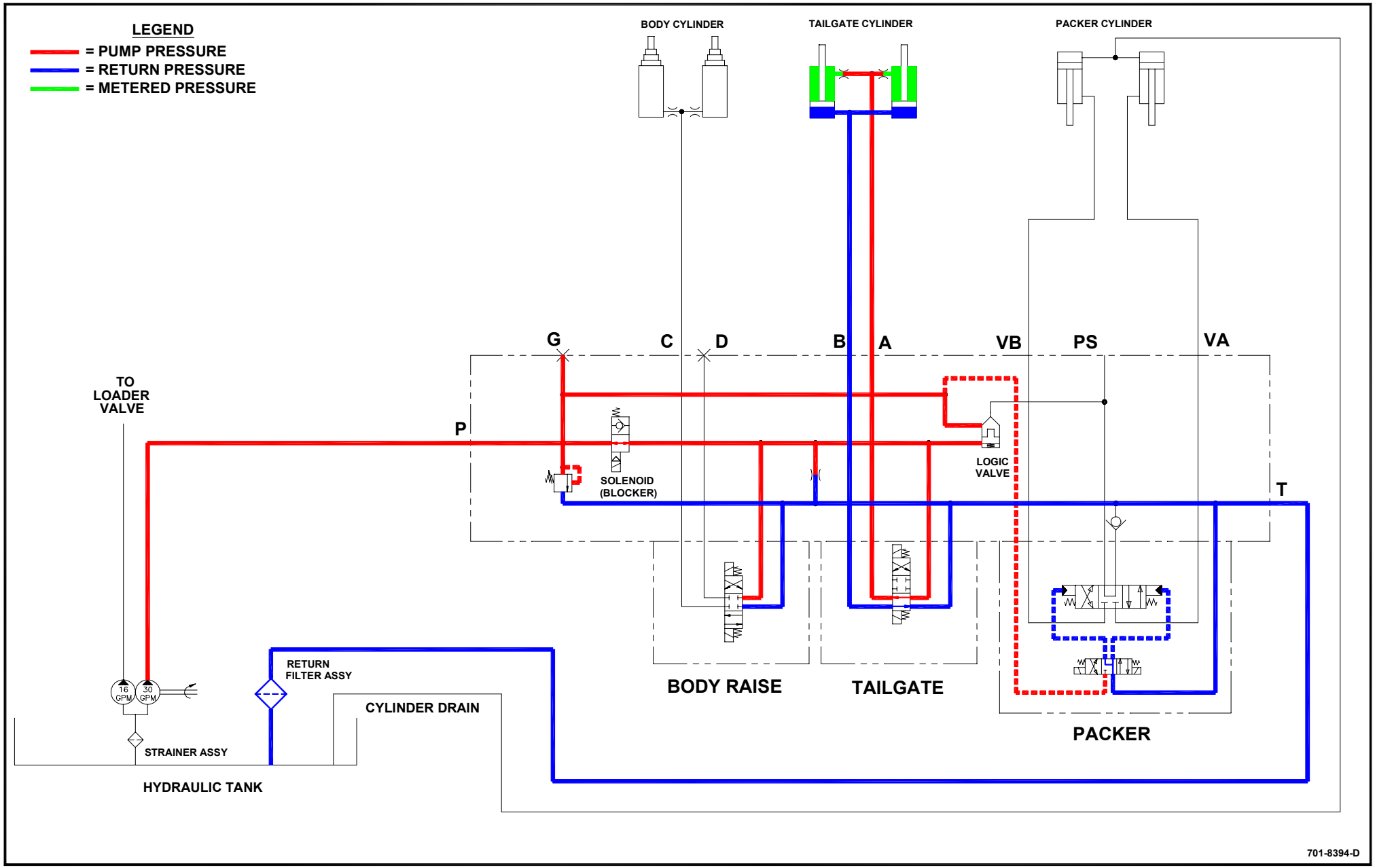
PACKER-RIGHT



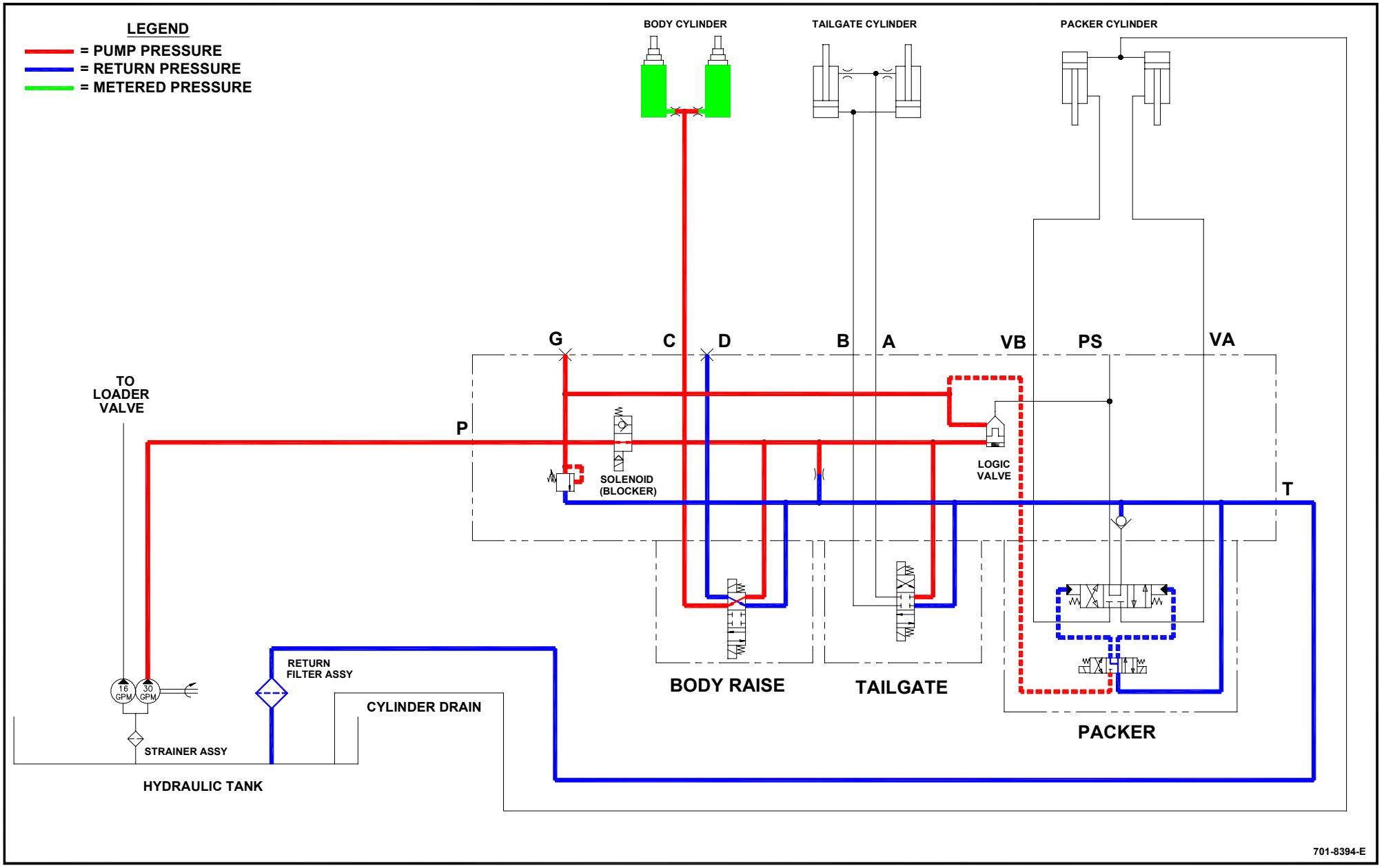
TG LOWER


LEGEND
= PUMP PRESSURE
= RETURN PRESSURE
= METERED PRESSURE
BODY CYLINDER
TAILGATE CYLINDER
PACKER CYLINDER
G
C
D
B
A
VB
PS
VA
P
T
TO LOADER VALVE
SOLENOID (BLOCKER)
LOGIC VALVE
16 GPM
30 GPM
RETURN FILTER ASSY
CYLINDER DRAIN
STRAINER ASSY
HYDRAULIC TANK
BODY RAISE
TAILGATE
PACKER
701-8394-C

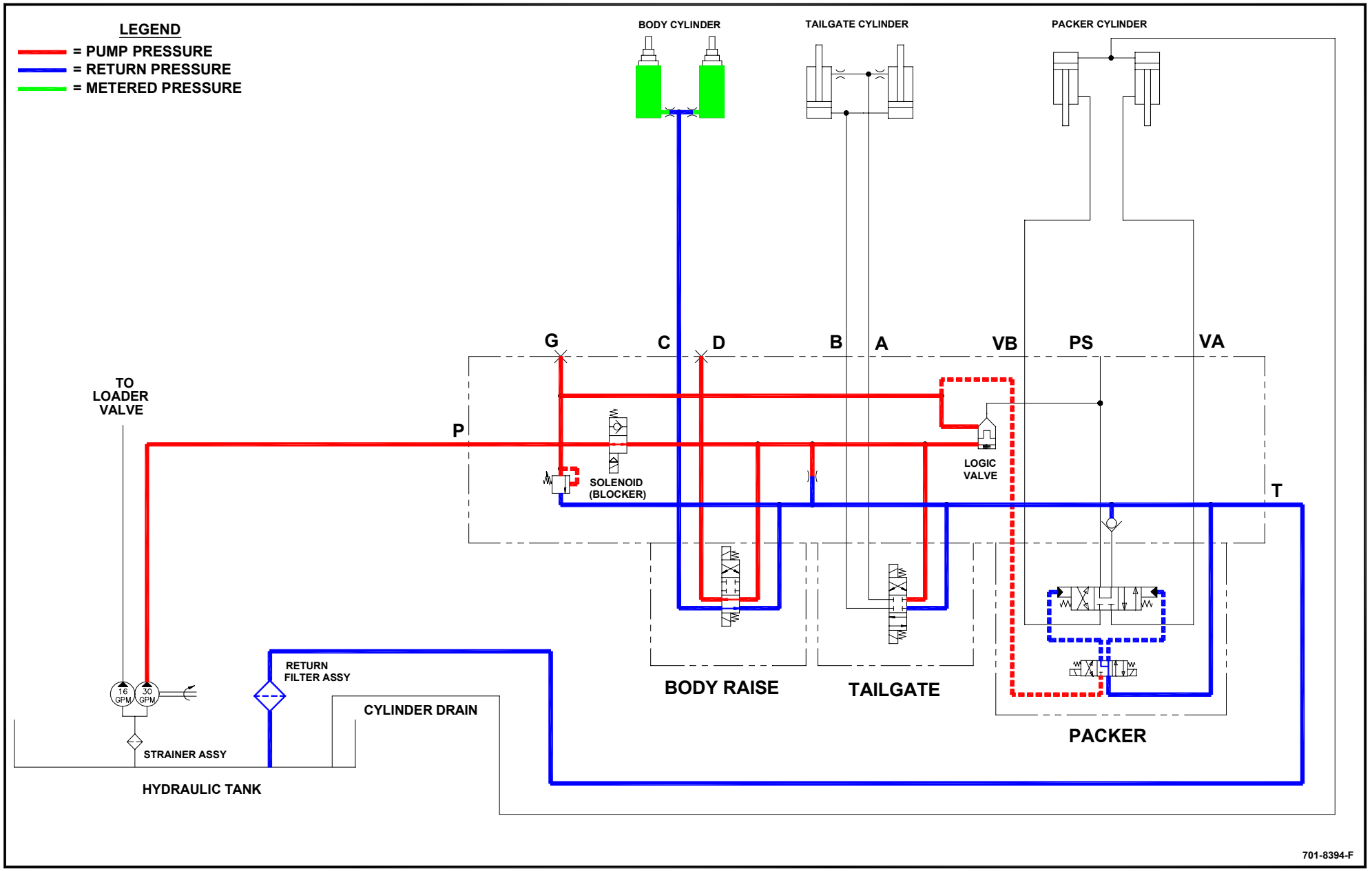
TG RAISE


LEGEND
= PUMP PRESSURE
= RETURN PRESSURE
= METERED PRESSURE
BODY CYLINDER
TAILGATE CYLINDER
PACKER CYLINDER
G
C
D
B
A
VB
PS
VA
P
T
TO LOADER VALVE
SOLENOID (BLOCKER)
LOGIC VALVE
RETURN FILTER ASSY
CYLINDER DRAIN
16 GPM
30 GPM
STRAINER ASSY
HYDRAULIC TANK
BODY RAISE
TAILGATE
PACKER
701-8394-D

BODY RAISE


LEGEND
= PUMP PRESSURE
= RETURN PRESSURE
= METERED PRESSURE
BODY CYLINDER
TAILGATE CYLINDER
PACKER CYLINDER
G
C
D
B
A
VB
PS
VA
P
T
TO LOADER VALVE
SOLENOID (BLOCKER)
LOGIC VALVE
16 GPM
30 GPM
RETURN FILTER ASSY
CYLINDER DRAIN
STRAINER ASSY
HYDRAULIC TANK
BODY RAISE
TAILGATE
PACKER
701-8394-E

BODY DOWN


LEGEND
= PUMP PRESSURE
= RETURN PRESSURE
= METERED PRESSURE
BODY CYLINDER
TAILGATE CYLINDER
PACKER CYLINDER
G
C
D
B
A
VB
PS
VA
P
T
TO LOADER VALVE
SOLENOID (BLOCKER)
LOGIC VALVE
16 GPM
30 GPM
RETURN FILTER ASSY
CYLINDER DRAIN
STRAINER ASSY
HYDRAULIC TANK
BODY RAISE
TAILGATE
PACKER
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HEIL ENVIRONMENTAL WARRANTY STATEMENT

The Heil Co. d/b/a Heil Environmental ("Heil") warrants its solid waste collection equipment to be free from defects in material and workmanship under normal use for a period of one (1) year or 2000 hours of operation (whichever comes first) from the date of equipment In-Service or during the period of coverage offered by an extended warranty program, when proper service and maintenance as described in Heil Service Bulletins and Parts & Service Manuals are performed. The standard or extended equipment warranty is not transferable except for sales demonstration units.

This warranty is expressly limited to the repair or replacement of any component or part thereof, of any such refuse or recycling collection body manufactured by Heil that is proven to Heil's satisfaction to have been defective in material or workmanship. Such components or parts shall be repaired or replaced at Heil's option without cost to the standard purchaser for parts and labor provided such unit is returned to an authorized Heil Distributor for replacement or repair. The repair or replacement must be made during the standard or extended warranty coverage period. Before any warranty can be allowed on new equipment, a validated warranty registration form must be on file with Heil's Customer Service Department within sixty (60) days of the equipment's In-Service date. Wear items are excluded from warranty coverage.

All OEM service parts sold by Heil have a six (6) month warranty from the date of purchase. Aftermarket parts purchased from Heil are supported by a 90-day warranty. The parts warranty covers parts only, providing that factory inspection reveals a defect in material or workmanship. Labor, troubleshooting, equipment downtime, etc. is not covered under the parts warranty policy.

HEIL MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. HEIL DOES NOT ASSUME ANY LIABILITY OR ACCEPT CLAIMS FOR LOSS OF PROFITS, PRODUCT DOWN TIME OR ANY OTHER DIRECT, INCIDENTAL OR INDIRECT CONSEQUENTIAL LOSSES, COSTS, DAMAGES OR DELAYS.

Any improper use, operation beyond rated equipment or component capacity, substitution of parts that are not Heil-approved, or any alteration or repair by others in such a manner as in Heil's sole judgment affect the product operation or integrity shall void the warranty.

Other than the extension of the standard warranty period purchased under a supplemental Heil Extended Warranty Program, no employee or representative is authorized to modify this warranty in any way nor shall any other warranties be granted. No dealer-supplied warranty program is endorsed or supported by Heil.

Heil retains the right to modify its factory warranty program prospectively at any time.

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866-ASK-HEIL
(866-275-4345)

Heil Environmental
4301 Gault Avenue North
Fort Payne, AL 35967-9984

Parts Central:
800-528-5308

Technical Service:
866-310-4345
TechSupport@DoverESG.com